National MAP-21 Implementation and Monitoring

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EXECUTIVE SUMMARY

This report presents an analysis of performance measures adopted by states and Metropolitan Planning Organizations (MPOs) in light of the adoption of such measures in the Moving Ahead for Progress in the 21st Century Act (MAP-21).

MAP-21 was signed into law by President Obama on July 6, 2012. It featured a new federal emphasis on performance measurement. This focus promotes transparency of public data and decision-making and attempts to improve the accountability of public spending by better-linking investments to outcomes. MAP-21 identified seven thematic areas for which the Secretary of Transportation determined performance measures should be adopted. These areas include (1) safety, (2) infrastructure condition, (3) congestion reduction, (4) system reliability, (5) freight movement and economic vitality, (6) environmental sustainability, and (7) reduced project delivery delays.

This report presents a summary of existing literature pertaining to the relationship between transportation and a range of aspects that are potential measures of performance, including economic growth, public health, and environmental quality. The review suggests the importance of transportation that further accentuates the need to perform and implement transportation performance measures. This report also discusses the burgeoning literature on MAP-21, as researchers and practitioners have presented a variety of methods that could help state Department of Transportation (DOT) and MPOs in setting up and operationalizing system performance measures, collecting data and performing analyses, and evaluating the system through target-setting measures.

Analyses of performance measures at the state-level found 64 performance indicators that fall under the umbrella of the seven areas upon which MAP-21 put an emphasize. Some states have adopted the performance measures as will be required by federal law; however, the results of the analysis indicate a considerable number of states have not yet set measures that would meet federal requirements. A variety

of factors might be attributed to this lack of universal adoption, e.g., our analyses using official agency documents, reports, and interviews up to the year 2013, state DOTs decided to wait for specific federal requirements that rendered state DOTs unable to implement certain measures, among other factors.

At the MPO-level, the substantial variety of measures used at the regional level made it difficult to make comparable analyses across the indicators. The project team studied 377 MPOs across the country and selected 40 MPOs for further detailed analyses. The analyses revealed similar findings to those at the state-level where some MPOs have implemented performance measures as suggested by the federal legislation while many other MPOs have not yet adopted any performance measures.

An analysis of measures implemented by all state DOTs and MPOs reveals that agencies have independently implemented a vast number of measures that fall into the seven with the exception of significant deficiencies in freight movement and economic vitality and environmental sustainability measures. These findings and those from the literature suggest the following policy implications: 1) ensure coherent and synchronized performance measures across federal, states, and MPOs; 2) implement target-setting performance measures that, 3) recognize and scale for local circumstances; 4) provide more federal technical assistance to develop performance measures.

Abbreviations

DOT	Department of Transportation
FAST	Fixing America's Surface Transportation Act
LOS	Level of Service
MAP-21	Moving Ahead for Progress in the 21st Century Act
MPO	Metropolitan Planning Organization
ROW	Right of Way
VMT	Vehicle Miles Traveled

CHAPTER 1. INTRODUCTION

Background

On July 6, 2012, President Obama signed into law P.L. 112-141, the Moving Ahead for Progress in the 21st Century Act (MAP-21). The first multi-year surface transportation authorization enacted since 2005. MAP-21 authorized funds for transportation programs at over $105 billion for fiscal years (FY) 2013 and 2014. It consolidated the number of federal programs from 90 to less than 30, eliminated earmarks and created a focused freight program. MAP-21 represents a shift in paradigm for transportation planning, one that is much more investment oriented and concerned about return on investment.

MAP-21 features a new federal emphasis on performance measurement. This focus promotes transparency of public data and decision-making and attempts to improve the accountability of public spending by better-linking investments to outcomes. Transportation funding decisions are focused around transparent evaluation criteria with transportation stakeholders and service providers assisting in the development of performance measures. Metropolitan Planning Organizations (MPOs) are included in the identification of goals, targets, and performance measures in cooperation with states. MAP-21 requires states to develop performance measures and targets for various issues under each of the core program areas, and develop plans to meet those targets.

MAP-21 identified seven thematic areas for which the Secretary of Transportation determined performance measures should be adopted. Simultaneously, State DOTs developed their own performance measures that they have determined to be consistent within the seven areas. These areas include (1) safety, (2) infrastructure condition, (3) congestion reduction, (4) system reliability, (5) freight movement and economic vitality, (6) environmental sustainability, and (7) reduced project delivery delays. Both the Transportation Secretary and the State DOTS also developed minimum target standards to quantify

whether these performance measures have been successfully implemented and resulted in meaningful system improvements.

The project team examined the process by which states and MPOs have adopted a performance-based planning process, contextualizing the relevance of adopted measures with regard to other important indicators and developed a national database to benchmark performance progress. The project has identified desired transportation system performance characteristics and performance measures evaluated within the context of specific performance targets in accordance with MAP-21 national requirements and those for MPOs and DOT's. It also examined strategies to integrate these performance measures into statewide and regional planning processes. The project has gathered data from each entity to construct a database that can be used to benchmark and track national progress on performance indicators.

The finding of this project contributes to the: 1) general knowledge about state and MPO performance measurement process and implementation, 2) knowledge on performance measurement relevance, and 3) provides a national database and status report on indicator progress.

In the following section, we develop a review of the existing literature related to transportation and its relationship with a range of topics, e.g., economic growth, public health, and environmental quality, and themed areas, e.g., safety, infrastructure condition. The subsequent section reviews academic literature as it pertains MAP-21.

Literature Review

Relationship between transportation performance and economic growth, public health, and environmental quality

It is widely accepted that transportation is closely related to a region's development, specifically economic growth, public health, and environmental quality. The accessibility and mobility of a transportation system influences the economic development of a region by playing a direct role in how easily people move around, how commodities are transported, and how well a region is connected to other regions. A transportation system is also closely associated with public health, as it affects people's lifestyles and safety as well as people's access to health-related commodities. Transportation can also affect the environmental quality of a region, as it is a major source of air pollution, greenhouse gas emissions, and noise pollution. Although a lot of studies have qualitatively identified the relationship between transportation and these other aspects of development, few quantify the relationship or try to build the link between transportation performance and other aspects of development. This literature review examines studies on the relationship between transportation and its many externalities to identify the nexus between transportation, performance measurement and desired outcomes.

Transportation Network and Economic Growth

Previous research has examined the impact of investments in transportation on economic growth, but very few studies attempted to measure transportation performance. The investment in transportation infrastructure often has a noticeable positive impact on economic growth, as it creates jobs directly and enlarges the capacity of the economy of a region by increasing productivity and land values. However, one can argue that any type of investment is associated with economic growth and the economic impact of transportation investment cannot illustrate the role that transportation plays in economic growth. Instead of measuring investment in transportation, the transportation performance may be a more direct

measurement of how well as transportation system is functioning. Thus, the relationship between transportation performance and economic growth may better explain the impact that transportation has on the economy.

Canning & Fay (1993) examine the effects of transportation networks on economic growth across different countries and through different time periods. Their data set is a panel of 96 countries for the period 1960 to 1985 taken at a 5-year interval. They developed two sets of regression models to detect the relationship between the transportation network and both GDP and average economic growth rates, measures of economic output and growth respectively. The transportation network was measured by combining the length of railway and the length of paved road in each country. The models also included variables to control for the different characteristics of each country the physical capital. These control variables included variables measuring labor force, human capital per worker (education attainment), consumption of oil, percent of workforce in industry, homogeneity index, and government consumption.

Based on the models and their analysis, Canning & Fay (1993) postulated that "transportation infrastructure appears to have normal rates of return in developed countries, extraordinarily high rates of return in industrializing countries, and moderate rates of return in underdeveloped countries." They noted that their results also imply that the effect of infrastructure is slow to occur but long-lived: "an increase in infrastructure has little short run impact on output but leads to a higher growth rate and higher output in the long run" (Canning & Fay, 1993). However, one issue of the models developed is that the independent variables included in the model, such as physical capital, labor force, and oil consumption, might be highly correlated with the dependent variable of annual GDP or annual growth rates of GDP, and may bias the estimation of the coefficients severely.

Ozment (2006) also developed a paper on assessing transportation contributions to the economic performance of developing countries. Ozment's basic assumption is that if transportation contributes to the economic development of a nation, improvements in certain indicators of economic activity and well-

being should be expected following improvements in transportation (Ozment, 2006). Therefore, Ozment employed a data set of 44 African countries from the Central Intelligence Agency's World Factbook and analyzed the data over a twelve year period from 1981 to 1993. The dependent variable of the regression analysis is the GDP per capita of those developing countries and the independent variables include: 1993 population, the average annual percentage changes from 1981-1987 of population, kilometers of railroad, kilometers of highway, kilometers of paved highway, the number of usable airports, the number of airports with permanent runways, the number of TV stations, and the literacy rate (Ozment, 2006). Based on the model he developed, Ozment (2006) suggested that the significant correlation between rail network, paved highways, and airports with permanent runways with GDP per capita suggests that transportation is of vital importance to developing countries; however, he also admitted that the research might lack adequate data which would permit a more robust analysis.

The literature reviewed above used nation-level data to perform regression analysis. Although many studies have attempted to quantitatively examine the relationship between the investment in transportation and economic development, no existing study is found to examine the relationship between the overall transportation performance and economic development across states of the US or at even smaller geographical scales.

Traffic Congestion and Economic Growth

The level of traffic congestion is an important indicator of the performance of a transportation system, and the MAP-21 also set congestion reduction as a national goal. Hartgen, Fields, & Moore (2009) developed an analysis to identify the effect of traffic congestion on regional economic performance.

The analysis of Hartgen et al. (2009) is based on the theory that the impact of traffic congestion on the economy is mainly through the lost productivity from more time traveling to work sacrificing either time working or time spent for personal activities. Hartgen et al. (2009) test how much economic gain will be obtained by improving accessibility. In order to test that, Hartgen et al. (2009) first divided places of

activities into five subcategories, including CBD, suburb, university, mall, and airport, and then "used straightforward log-linear regression models to estimate models relating regional productivity (GRP per worker) to accessibility measures for each of the five different types of regional points." Regional productivity, is related to tax rates, crime, education, and other features, which are typically expressed in log-linear form. The detailed formula is as follows:

$$\text{Ln}(GRP/w) = \ln a + b\text{Ln}(Xtt),$$

where the Xtt is the size of the population or the jobs within 'tt' minutes of the point.

The result of the regression model is shown in Table 1. The regression model estimates the GRP per worker according to a certain level of accessibility. Hartgen et al. (2009) hypothesized that an increase in GRP would be associated with an increase in accessibility due to the removal of existing traffic congestion. The model was run for eight cities: Charlotte, Detroit, Salt Lake City, Seattle, Denver, San Francisco, Dallas, and Atlanta. Their overall results from the analysis "suggest that reducing congestion and increasing travel speeds so that accessibility increases by 10% would increase regional economic productivity by about 1%. The impact on productivity was stronger for employment rather than residential population" (Hartgen et al. 2009). The results also suggest that

> access to major malls (as job sites) is at least as and probably even more influential in determining regional productivity than access to the CBD. Reducing congestion to improve access to a mall by 10 percent would generate a productivity improvement of about 1.7 percent. Improved access to major suburbs tended to have productivity improvements in the range of 1.3 percent to 1.6 percent, lower than for universities but higher than for CBDs. Improved access to universities had among the strongest impact on regional productivity, ranging from 1.3 percent to 1.8 percent (Hartgen et al. 2009).

Although some relationships are found to be statistically significant between congestion and the economy, the limited sample size of this study reduces its statistical power.

Table 1. Summary of best 25-minute productivity models

Criterion	Location	Time Band	Intercept (a)	t-value	Accessibility Elasticity (b)	t-value	time var (c)	t-value	RSQ	n
Jobs	University	25	9.2	17.1	0.18	4.3	0.003	0.2	0.81	8
Jobs	Suburb	25	9.6	13.8	0.15	2.8	0.009	0.5	0.64	8
Pop	University	25	9.15	8.8	0.18	2.3	-0.003	-0.1	0.55	8
Pop	Suburb	25	10.0	10.5	0.11	1.6	0.007	0.3	0.38	8
Jobs	CBD	25	10.0	7.8	0.11	1.2	0.022	0.9	0.28	8
Pop	Mall	25	9.5	5.6	0.14	1.2	0.021	0.8	0.27	8
Pop	CBD	25	10.2	7.9	0.10	1.0	0.015	0.6	0.24	8
Jobs	Mall	25	10.0	6.3	0.12	1.0	0.023	0.9	0.23	8
Jobs	Airport	25	10.9	8.2	0.04	0.5	0.027	0.8	0.11	8
Pop	Airport	25	11.09	8.5	0.03	0.3	0.021	0.7	0.09	8

Source: Hartgen et al. (2009)

Accessibility and Economic Growth

Accessibility is an important indicator of the transportation performance in an area. Ozbay, Ozmen-Ertekin, & Berechman (2003) developed a series of regression analysis to test the relationship between accessibility and economic growth. Their study area includes the 17 counties in the greater New York City region, including northern New Jersey and southern New York. The economic data for their study are from the Complete Economic and Demographic Data Source (CEDDS) by Woods and Poole Economics in 1990 and 2000, and their travel time data, which are used to calculate the accessibility indexes, are from the North Jersey Transportation Authority (Ozbay et al., 2003).

The general form of the multiple linear regression models developed in this study is shown in the following expression, which represents the economic growth in each county in the study area.

$$\mathrm{AAEGR(or\ AATEC)} = \beta_0 + \beta_{TBP}.\mathrm{TBP} + \beta_{TBE}.\mathrm{TBE} + \beta_{AAEGRadj}.\mathrm{AAEGR}_{adj} + \beta_{AAPCadj}.\mathrm{AAPC}_{adj} + \beta_{AARSC}.\mathrm{AARSC(or}\ \beta_{AAEGR}.\mathrm{AAEGR)} + \beta_{AI}.\mathrm{AI}$$

where,

AAEGR	Average Annual Employment Growth Value between years 1990-2000
AATEC	Average Annual Total Earnings Change between 1990-2000
TBP	Total Base year Population per Acre in 1990
TBE	Total Base year Employment per Acre in 1990

AAEGRadj	Average Annual Employment Growth Value in adjacent counties (except the county itself) between years 1990-2000
AAPCadj	Average Annual Population Change in adjacent counties (except the county itself) between years 1990-2000
AARSC	Average Annual Total Retail Sales Change between years1990-2000
AI	Differences of accessibility index values measured by three different methods between 1990- 2000 (that is, change in accessibility index between 1990-2000 for each county).

Six regression models were developed for the expression above with two different dependent variables (AAEGR and AATEC) and with the three different AI terms (Ozbay et al., 2003). Ozbay et al. (2003) selected one best model for each response variable of AAEGR and AATEC respectively, and the results of the two models are shown in Table 2. The dependent variable of Model 2 is AAEGR and the dependent variable of Model 4 is AATEC.

Although Ozbay et al. (2003) notes that significant impact of accessibility (AI) is found on economic development (AAEGR or AATEC), there is one serious issue with the regression models: though both models have high adjusted R-squared, the binary correlations between the variables in Table 3 shows that there is significant AAEGR, AATEC, and AARSC, which should be the main cause of the high adjusted R-squared.

Table 2. Parameters of the two models: Model 2 and Model 4

Variables	Model 2	ES[c]	Model 4	ES
Intercept	-19.64 {0.001}[a], (-4.24)[b]		9.8 {0.024}, (2.628)	
TBP	0.212 {0.074}, (1.97)	+	-0.154 {0.205}, (-1.348)	-
TBE	-0.108 {0.129}, (-1.64)	-	0.165 {0.04}, (2.329)	+
$AAEGR_{adi}$	-1.43 {0.075}, (-1.97)	-	-0.562 {0.54}, (-0.631)	-
$AAPC_{adi}$	2.53 {0.05}, (2.18)	+	0.8 {0.587}, (0.56)	+
AARSC	1.26 {0}, (5.68)	+		
AAEGR			1.034 {0}, (5.24)	+
AI	11.68 {0.248}, (1.22)	+	-0.529 {0.03}, (-2.485)	-
Multiple R^2	0.94		0.95	
R^2	0.88		0.91	
Adjusted R^2	0.81		0.86	
Standard Error	4.51		5.48	
Skewness of Residuals	-0.517		0.023	
Kurtosis of Residuals	-0.118		0.005	
Observations	18		18	

[a]Numbers in braces are the p-values, or the probabilities that the independent variable has no effect on the dependent variable. Smaller p-values are favorable.
[b]Numbers in paranthesis are the t-statistics values.
[c]Expected sign of the independent variable.

Source: Ozbay et al., (2003)

Table 3. Correlation table between variables related to accessibility and economic growth

	AAEGR	AATEC	TBP	TBE	$AAEGR_{adj}$	$AAPC_{adj}$	AARSC	AI^a	AI^b	AI^c
AAEGR	1									
AATEC	0.892	1								
TBP	-0.396	-0.270	1							
TBE	-0.274	-0.050	0.805	1						
$AAEGR_{adj}$	0.437	0.361	-0.419	-0.182	1					
$AAPC_{adj}$	0.541	0.435	-0.535	-0.318	0.955	1				
AARSC	0.863	0.893	-0.467	-0.152	0.522	0.565	1			
AI^a	-0.494	-0.653	0.065	0.024	-0.065	-0.069	-0.499	1		
AI^b	0.114	0.151	0.197	0.078	-0.243	-0.320	0.026	-0.072	1	
AI^c	0.262	0.286	-0.007	-0.025	-0.159	-0.136	0.162	-0.141	0.076	1

[a] Difference in accessibility index measured by Ingram's method as given in expression 3 between 1990-2000.
[b] Difference in accessibility index measured by the formula given in expression 5 between 1990-2000.
[c] Difference in accessibility index measured by Black and Conroy's graphical method as given in expression 4 between 1990-2000.

Source: Ozbay et al., (2003)

Mobility and Economic Growth

Mobility is another important indicator of transportation performance. However, there are few studies that identify a direct relationship between transportation mobility and economic development. Prud'homme & Lee (1998) developed regression analysis to measure the relationship between the effective size of the labor market of an area with its level of sprawl (the average potential job-home distance) and speed (the average travel speed), given the city size for 22 French cities in 1990. The result is shown in Table 4.

They define the speed (V) as the total distance traveled within that city divided by the total travel time, which can be expressed as the following formula:

$$V = \Sigma_{ij} d_{ij} / \Sigma_{ij} T_{ij}$$

"The elasticities of labor market size with respect to average transport speed are 1.46 and 1.79. This means that a 10% increase in average speed, all other things constant, leads to a 15-18% increase in the labor market size" (Prud'homme & Lee, 1998). Their conclusion, based on established theory and the regression analysis, is that "the efficiency of a city is a function of the effective size of its labor market, and that this labor market is itself a function of the overall size of the city, but also of its sprawl and of the speed which trips in the city are made" (Prud'homme & Lee, 1998).

Table 4. Coefficients of Regression Analysis Explaining Efficiency by Size, Sprawl, and Speed, 22 French cities, circa 1990

	Dependent Variable	Intercept	Size (S)	Sprawl (D)	Speed (V)	R2	Form
(1)	L(25)	-91.0 (-2.9)	0.202 (9.3)	-16.87 (-4.32)	16.04 (4.67)	0.89	Linear
(2)	E(25)	-42.5 (-1.31)	0.183 (8.22)	-15.00 (-3.73)	12.36 (3.46)	0.86	Linear
(3)	L(25)	-4.29 (-2.29)	1.07 (8.30)	-1.17 (-3.75)	1.79	0.88	Log-Log
(4)	E(25)	-2.86 (-2.29)	0.97 (8.27)	-1.12 (-3.93)	1.46 (2.90)	0.87	Log-Log

Notes: L(25) is the effective labor size of the labor market at 25 minutes from the view point of workers; R(25) is the same concept from the view point of enterprises; Size is the population of the agglomerations, in 1,000; Sprawl is the average potential job-home distance; speed is the average speed as defined in the text; number in parentheses are the T values.

Source: Prud'homme & Lee (1998)

Transportation Safety and Economic Development

Qu, Schultz, & Al Malik (2008) have developed a series of regression models to evaluate the relationship between transportation safety, which is measured by traffic-related death rate, and economic development, which is measured by 14 social economic indices, for 28 sample countries.

The 14 social economic indices in the regression analysis of Qu et al. (2008) include:

- Indices of comprehensive development such as GDP (x1) and per capita GNP (x2).
- Indices of social structure including percentage of agricultural products in GDP (x3), tertiary industry product (x4), percentage of export of cargo and service in GDP (x5), percentage of urban population in national population (x6), percentage of public education in GDP (x7), and percentage of scientific research devotion in GDP (x14).
- Indices of population quality including enrollment rate of middle school students (x8), population growth rate (x9), and infant death rate (x10).
- Quality of life indices such as doctors per 1,000 persons (x11).
- Indices of social stability including unemployment rate (x12) and percentage of nonagricultural employment (x13).

They developed two regression models with the traffic-related death rate in 1990 and 2000 as the dependent variables respectively. The results are shown in Table 5 and Table 6. Their conclusion is that safety tends to improve with social economic development and is affected by a variety of factors such as industrial structures, employment, science technology education, and economic development (Qu et al., 2008). Although the regression models were developed in their analysis, the theory that can explain the causal relationship between traffic safety and social economic development has not been established.

Table 5. Regression coefficient check of sample model in 1990

	Independent variable	Partial correlation coefficient	*t*-statistic	Level of significance	Standardized partial regression coefficient
$\gamma(y, x_2)$	GNP	-0.3659	1.2564	0.1125	-0.3425
$\gamma(y, x_3)$	Percentage of agricultural product in GDP	-0.6201	3.2144	0.0036	-0.9874
$\gamma(y, x_6)$	Percentage of urban population in national population	0.6235	3.2699	0.0041	1.2121
$\gamma(y, x_7)$	Percentage of public education in GDP	0.5102	2.0655	0.0510	0.3985
$\gamma(y, x_8)$	Enrollment rate of middle school students	0.2659	1.9512	0.0851	0.4649
$\gamma(y, x_{12})$	Rate of unemployment	0.3595	1.5014	0.1951	0.5031
$\gamma(y, x_{13})$	Percentage of nonagricultural employment	0.2545	4.6621	0.0002	-2.3654

Source: Qu et al. (2008)

Table 6. Regression coefficient check of sample model in 2000

	Independent variable	Partial correlation coefficient	*t*-statistic	Level of significance	Standardized partial regression coefficient
$\gamma(y, x_2)$	GNP	-0.6215	3.1125	0.0025	-0.6645
$\gamma(y, x_3)$	Percentage of agricultural product in GDP	-0.7821	1.6654	0.3156	-0.4567
$\gamma(y, x_4)$	Tertiary industry product	0.5789	2.0548	0.03349	0.3215
$\gamma(y, x_6)$	Percentage of urban population in national population	0.2399	4.0125	0.00215	0.7012
$\gamma(y, x_8)$	Enrollment rate of middle school students	-0.5698	2.5589	0.09012	-0.2011
$\gamma(y, x_{12})$	Rate of unemployment	-0.3251	1.8712	0.2515	-0.5144
$\gamma(y, x_{13})$	Percentage of nonagricultural employment	-0.5123	3.1101	0.05879	-0.2174
$\gamma(y, x_{14})$	Percentage of scientific research devotion in GDP	0.5621	2.6548	0.1215	4.9981

Source: Qu et al. (2008)

Transportation, Public Health, and Environmental Quality

Few studies have been done to quantify the relationship between transportation performance and public health or other aspects concerning the quality of life, such as the environmental quality. Most previous articles in this field attempted to identify if there is some impact of transportation on public health and through which way transportation can affect public health.

Frank (2000) noted that there is a strong linkage between public health and people's physical activity. It was reported that sedentary people have a much higher risk of obesity, heart disease, diabetes, high blood pressure and other chronic diseases (Frank, 2000). Further studies suggest that attempts to increase physical activity among the most sedentary require modest lifestyle changes and identify walking and biking as the most feasible forms of activity (Shephard, 1997). Frank (2000) also noted that the total amount of time spent traveling, when taking all modes into account, has been relatively constant over the past several decades, which has been referred to as the "the law of constant travel time." Based on this theory, if people spend more time driving, they will tend to spend less time walking or biking, which might result in a more sedentary life style. Therefore, one way that transportation can affect public health is through its influence on people's travel behavior and lifestyle.

Litman (2013) summarized the various ways that transportation affects public health and better ways to incorporate public health objectives into transportation planning. As Litman (2013) noted, major categories of public health impacts that tend to be significantly affected by transport policies and planning decisions include traffic crashes, vehicle pollution exposure, physical activity and fitness, access to health-related goods (like health care, healthy foods, and recreation), and mental health impacts.

The vehicle pollution is not only associated with public health but also with the environmental quality. According to (RITA, 2012), transportation can have a great impact on environmental quality, mainly through its effect on the natural landscape, air pollution, greenhouse gas emissions, oil spills, and noise.

In light of the close relationship between transportation and sustainability, Texas DOT has developed a set of transportation performance measures to facilitate implementing TxDOT's strategic plan as illustrated in Ramani et al. (2009). A total of 13 performance measures covering the five goals under TxDOT's strategic plan were developed, which are shown in Table 7. This table also indicates how different aspects of the quality of life, or sustainability are associated with transportation, the performance of which can be quantified and measured correspondingly.

Table 7. Sustainability Objectives and Performance Measures for TxDOT's goals

TxDOT Goal	Sustainability-Related Objective	Performance Measure
Reduce congestion	Improve mobility on highways	Travel time index
	Improve reliability of highway travel	Buffer index
Enhance safety	Reduce crash rates and crash risk	Annual severe crashes per mile
	Improve traffic incident detection and response	Percentage lane-miles under traffic monitoring/surveillance
Expand economic opportunity	Optimize land-use mix for development potential	Land-use balance
	Improve road-based freight movement	Truck throughput efficiency
Increase the value of transportation assets	Maintain existing highway system quality	Average pavement condition score
	Reduce cost and impact of highway capacity expansion	Capacity addition within available right of way
	Leverage non-traditional funding sources for highways	Cost recovery from alternative sources
	Increase use of alternatives to single-occupant automobile travel	Proportion of non-single-occupant travel
Improve air quality	Reduce adverse human health impacts	Daily NO_x, CO, and VOC emissions per mile of roadway
	Reduce greenhouse gas emissions	Daily CO_2 emissions per mile of roadway
	Conform to emissions exposure standards	Attainment of ambient air quality standards

Source: Ramani et al. (2009)

Measuring Performance

A literature review conducted in 2010 found that there are three generations of performance measures in the US (Pei, Fischer, & Amekudzi-Kennedy, 2010). The first, circa 1993, was responsive to internal initiatives and legislation, but measures were not linked to other agency processes. The second generation, in the late 1990's, included measures intended to track business functions and planning goals. These measures were often too complex to clearly communicate progress to stakeholders. The third generation, in the early 200's responded to the political context and emphasized accountability, strategic planning, and asset management. With the implementation of MAP-21, there is a desire to further develop the concept and implementation of performance metrics across agencies (Pei et al., 2010).

Given the indication in the MAP-21 legislation that transportation funding will be linked to performance metrics, there have been several studies addressing the gaps between metrics and targets. There are two major components involved in setting performance measures: identifying the metric and setting the target. However, neither the metric nor the target is grounded in scientific research. According to an NCHRP Report titled *Performance Measures and Targets for Transportation Asset Management*, an ideal performance measure should: (1) be understandable by all audiences; (2) utilize already collected and well established database; (3) reflect the impacts of alternative modes; be capable of evaluating features that an agency can alter/adjust/control; and (4) apply to both short and long term outputs (Cambridge Systematics, Inc. (last), PB Consult, & Texas Transportation Institute, 2006). The report further broke the concept of transportation performance measures into categories:

(1) Preservation of Assets – generally averages or percentages of the system length or VMT
(2) Accessibility of the System (all modes) – often from a user's perspective
(3) Mobility – describes time/cost of trip (controlling for changes in population and fuel costs)
(4) Operations and Maintenance – effectiveness of the system throughput (includes cost effectiveness)
(5) Safety – the USDOT's national performance target is 1.0 fatalities per million VMT
(6) Environmental Impacts – Generally focus on air quality, ground water, noise, and protected species
(7) Economic Development – Direct and indirect measures of jobs and freight activity
(8) Social Impacts – The effect of transportation facilities on adjacent population groups and neighborhoods

A 2012 study identified a set of best practices for measuring highway maintenance and preservation (Zimmerman & Yurek, 2012). The study identified that conducting performance measure evaluations that provide continuous (or pseudo-continuous) measures of performance have certain advantages over pass/fail metrics. A continuous metric is more informative both in the moment and over time and a

specific target can be adjusted with overall performance. However, continuous measures general cost more in both time and money to measure and evaluate. The study recommends that measures be set to capture both the costs and benefits associated with each program. Furthermore, programs should be prioritized based on importance. For example, a measure of snow/ice clearance would be considered more important than a measure of roadside litter. Any change in technology should also be measured so that the benefits and costs associated with new technologies and system upgrades can be quantified. The study finally recommends that in the case when the entire system cannot be measured, that the sample be random and large enough to be of statistical value.

Summary

Overall, as briefly illustrated in Table 8, most of the existing literature either focuses on qualitative description of the relationship between transportation and economic development or quantitative exploration about the impact of investment in transportation on economic growth. No literature is found to apply a comprehensive measurement of transportation performance to identifying the impact of transportation on economic development. Although each of the literature above incorporates a certain indicator of transportation performance, like congestion, accessibility, mobility, and safety, none has attempted to measure transportation performance comprehensively. Most of the regression models in the previous studies contain some issues of multicollinearity or limited goodness-of-fit. Also, no study is found to quantify the relationship between transportation performance and public health, while the existing qualitative study on that relationship suggests a potential to develop such kind of study.

In summary, though there is little research on quantifying the relationship between the comprehensive transportation performance and other aspects that can reflect the development and quality of life in an area, there is a potential to do so, given the evident impact of transportation on economic growth, public health, environmental quality and so on.

Table 8. Summary of literature review

Topic	References	Summary
Transportation network and economic growth	Canning & Fay (1993); Ozment (2006)	Transportation infrastructure was found to be positively associated with economic growth as measured in terms of rates of return and GDP
Traffic congestion and economic growth	Hartgen et al. (2009)	Traffic congestion reduces regional productivity thus hinder economic growth
Accessibility and economic growth	Ozbay et al. (2003)	Statistically positively significant influence of accessibility to economic growth as measured in terms of employment growth and total earnings
Mobility and economic growth	Prud'homme & Lee (1998)	Speed (the average travel speed), as a proxy of mobility, was found to be positively associated with size of the labor market, as a proxy of economic growth.
Transportation safety and economic development	Qu et al. (2008)	Safety tends to improve with social economic development, which is affected by economic development, among other factors
Transportation, public health, and environmental quality	Frank (2000); Shephard (1997); Litman (2013); Ramani et al. (2009)	Transportation system and infrastructure could shape people's travel behavior and activities thus related to various health outcomes and environmental quality
Measuring performance	Pei et al. (2010); Zimmerman & Yurek (2012); Cambridge Systematics, Inc. (last) et al. (2006)	A brief historical overview of performance measures in the US and a set of guidance of a variety of aspects related to performance measurement

Literature pertains MAP-21

Emphasize on performance measures in MAP-21 has to some extent further amplified the number of research on that subject. Yet, it should be noted that the term performance measures have been used within the transportation community even before MAP-21 was signed into law, for instances the *NCHRP Report 708: A Guidebook for Sustainability Performance Measurement for Transportation Agencies* and the *Performance Measurement of Transportation Systems* published by the Transportation Research Board. Nonetheless, the influence of MAP-21 in creating the impetus for research on performance

measures is somewhat apparent. Most research to date tends focus on proposing methodologies and exploring potential data sources to conducting performance measurement for particular areas. In light of addressing likely data gap for conducting performance measurement, researchers have suggested the potential use of data from third-party, private sources to substitute or complement public data (Eisele, Schrank, & Fontaine, 2015; Liao, 2014; Pu, 2013; Remias et al., 2014; Wikander, Eisele, & Schrank, 2014). Pu (2013, p.57) accentuated the advantages of using private-sector traffic data due to "its unprecedented coverage and international and national comparability." A study by Remias et al. (2014, p.42) illustrated the benefit of using crowd-sourced data “to provide consistent nationwide network assessment.” In addition, Liao (2014) made the case of using combination of public and private data to generate reliable freight performance measures.

Researchers have also emphasized how performance-based approach brought under MAP-21 would help to make the case of particular transportation projects and how those projects would impact stakeholders and the environment (Ang-Olson, Crossett, Batista, & Choe, 2016; Morrow, Park, Randall, Sivasailam, & Son, 2013; Schofer, 2014; Smith-Colin, Fischer, Akofio-Sowah, & Amekudzi-Kennedy, 2014; Wu & Wemple, 2014). Morrow et al. (2013) employed scenario planning using the case of Metropolitan Washington Region based on the six components of scenario planning as suggested in MAP-21. Smith-Colin et al. (2014) postulated emphasize on performance measures in MAP-21 would further solidify the ground and make a case for the application of evidence-based approaches in transportation asset management. Wu & Wemple (2014) proposed cost-effectiveness sketch method to better capture safety analysis and investment decision making.

Following the implementation of MAP-21 initially intended for two-year authorization programs starting in late 2012 and was eventually extended four times (National Association of Counties (NACo), 2015), President Barack Obama signed into law the Fixing America’s Surface Transportation Act (FAST Act) on December 4, 2015. U.S. Department of Transportation (2015) described the FAST Act as "the first law enacted in over ten years that provides long-term funding certainty for surface transportation." Alongside

the emphasize on funding certainty over the long-term, the FAST Act identified several areas as the implementation highlights; these include safety, freight, project delivery, research, and the creation the National Surface Transportation and Innovative Finance Bureau.

In summary, in accordance with the implementation of MAP-21 that put emphasized on performance measurement, researchers have identified and suggested potential methods to be used to measuring the performance of transportation system and infrastructure. The extent to which and how these methods might prove useful and practical to help state agencies and MPOs across the nation to measuring transportation performance is not yet explored and could warrant further studies.

CHAPTER 2.

ANALYSES OF PERFORMANCE MEASURES AT STATE-LEVEL

Through an extensive review of states and MPOs' official agency reports and documents, the project team has developed a national database of performance measures at the state and MPO-level. The national database presents information that could be used as the foundation to benchmark and track national progress on specific performance indicators. The specific performance indicators are compiled and categorized in accordance with the MAP-21 national goals and programs on safety, infrastructure condition, congestion reduction, system reliability, freight movement and economic vitality, environmental sustainability, and reduced project delivery delays.

At the state-level, the project team identified 64 unique state performance indicators implemented by state DOTs. These indicators reflect the MAP-21-emphasized national goals and program. Our analyses indicated that some states have adopted the performance measures as required by the federal government prior to the enactment of MAP-21. Some states developed measures that go far beyond the minimum thresholds outlined by MAP-21 and in some cases developed their own performance measures in addition to the federally-mandated performance measurement; however, a considerable number of states have not yet set performance measures that meet the federal requirements or have not implemented any for performance based measurement. This following section describes in detail the performance indicators adopted by DOTs across the United States.

Safety

A total of 17 unique performance indicators related to transportation system safety measures were identified that conform to MAP-21 standards. In addition to those 17 measures, the several additional performance indicators adopted by states to complement the four federal performance measurements are highlighted in Table 9. As the table shows, the measures that appear to be most widely adopted are the

number of fatalities and number of fatalities per 100 million vehicle miles travelled (VMT) (Figure 1). Yet, as illustrated in the table, it appears that a noticeable number of states haven't adopted the required federal performance measurement. This notion was particularly true in the indicator for measuring the 'number of serious injuries per 100 million VMT' as there were only four states that have adopted the measure (Figure 2).

In terms of additional indicators not required by the national mandates, the project noticed certain measures that a considerable number of states reported. The indicator of 'number of crashes' was fairly adopted with 12 states mentioned this particular measure in their reports. Specific to the 'number of crashes' indicator, a handful number of states reported the number, while others reported per 100 million VMT. A few number of states appear to also put attention on the 'worker incident rate – injuries/illness' and 'percent seatbelt usage' as there were 12 and 11 states reported those measures, respectively. In terms of 'worker incident rate – injuries/illness', a great number of states reported the rate per 100 workers. While in indicator of 'number of workzone incidents', a majority of 9 states that measured this indicator reported the incidents based on crashes, fatalities, and injuries; however, some states appear to simply report the number of incidents.

In accordance with a reported in increase in the number of annual non-motorized trips over the past several years, there were seven states that put in place measures to calculate the number of non-motorized (pedestrian and or bicyclists) accidents.

Table 9. Summary of state safety-based performance indicators

No	Measures	Number measuring/mentioned
1	Number of fatalities	27
2	Number of fatalities per 100 million VMT	21
3	Number of serious injuries	17
4	Number of serious injuries per 100 million VMT	4
5	Number of crashes	12
6	Number of crashes with impaired drivers	4
7	Number of workzone incidents	9
8	Number of non-motorized (pedestrian and or bicyclists)	7
9	Number of unrestrained fatalities	6
10	Worker incident rate – injuries/illness	12

11	Percent seatbelt usage	11
12	Transit safety measures (accident, injury, fatality rates)	4
13	Number of fatalities/injuries from at grade rail	4
14	Seat belt citations issued during grant-funded enforcement activities	3
15	Impaired driving arrests made during grant-funded enforcement activities	3
16	Speeding citations issued during grant-funded enforcement activities	3
17	Number of commercial vehicle safety inspections	2

*) Highlighted in blue: federal performance measurements required to be adopted by states

Figure 1. States that measured number of fatalities (left) and fatalities per 100 million VMT (right)

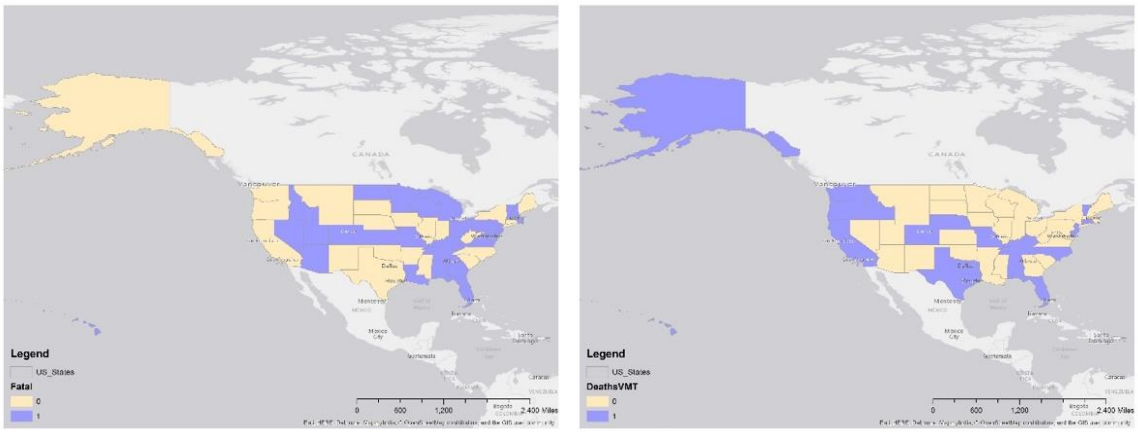
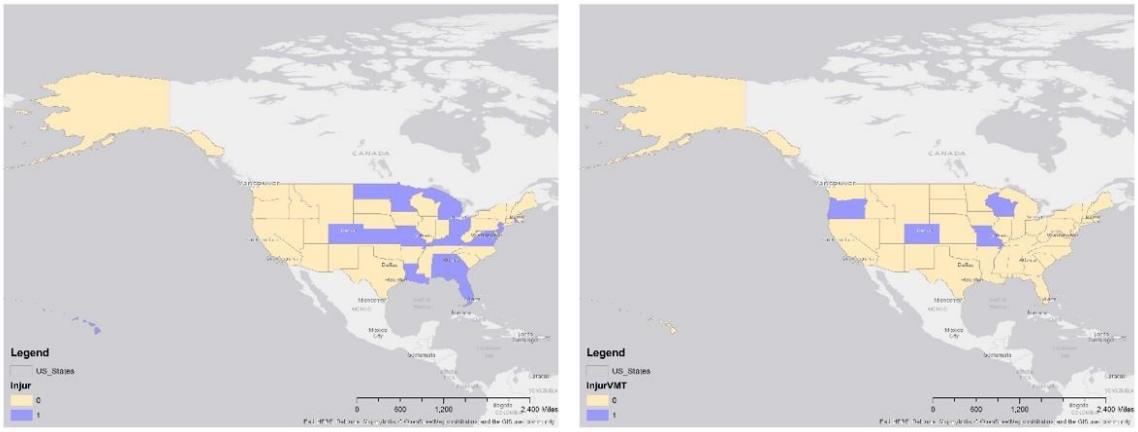


Figure 2. States that measured number of serious injuries (left) and serious injuries/100 million VMT (right)



*Blue: States that have measures; Yellow: States that do not have measures

In summary, per our analyses show that up to the year 2013, it appeared some states have adopted safety measures as required by federal regulation, i.e., 'number of fatalities', 'number of fatalities per 100 million VMT', 'number of serious injuries', and 'number of serious injuries per 100 million VMT'. The measure of 'number of serious injuries per 100 million VMT', however, was not widely adopted despite

being required by the federal government. In addition to the federally-required measures, states have also adopted a variety of safety measures as can be seen in Table 9.

Infrastructure Condition

MAP-21 performance measurements provide guidance on three infrastructure condition indicators that should be adopted by states. These measures include the condition of pavement on the Interstate system, the condition of pavement on the National Highway System (excluding the Interstate), and the condition of bridges on the National Highway System. The project team found that these federally-mandated measures were being incorporated into local performance measures in a way that is different from the measures specified by the federal legislation. However, the general principles of the federal performance measures have to some extent been incorporated within these locality specific measures. For example, it was considered that the 'percent of system by condition level' and 'number/percent of bridges by condition level' as the two indicators that reflect the federal performance measurement as mentioned above.

In terms of the measure 'percent of system by condition level', the project consider this measure as an aggregation of a variety of different measures adopted by states, which includes measures such as 'percentage of entire network with good ride quality', 'percentage of roadway pavement condition index "good/excellent" (and by interstate, federal non-interstate, local roadways)', and 'percentage of interstates meeting state standards'.

Similarly, the measure of 'number/percent of bridges by condition level' is a product of accumulating a variety of different measures at the state level, for instances, 'number/percent of structurally deficient bridges' and 'number/percent of bridges in good repair'.

In addition to the indicators that align with the federal requirement, the project identified 18 additional comparable indicators across states (see Table 10), most of them were centered on measuring the level of

service (LOS). A few number of indicators were geographic-specific that appeared to be relevant in some states only. For instances, the indicator of 'percent of roadways clear during winter storm' seems not to be relevant in all states. More specific regarding this measure, Missouri, New Hampshire, and Wisconsin are states that measured time to clear major roads during winter storm.

Some states also put an emphasizes on non-motorized mode-specific infrastructure, which is a set of noteworthy additional measures which deviate from the federal performance measures that focus more on highway infrastructure. For instances, Connecticut and Maryland are among the states that measure the 'percent of roadways with fair bicycle level of comfort'. The State of Maryland is also among the group of states that measured 'percent of sidewalks in good condition'.

A significant number and variety of measures adopted by states relate to infrastructure condition. Specific to the measures required by federal regulation, i.e., 'percent of system by condition level' and 'number/percent of bridges by condition level', the project found that most states have adopted measures that could fall within those federal requirements. Other measures that a considerable number of states adopted appear to be centered upon measuring LOS of various transportation facilities.

Table 10. Summary of state performance indicators on infrastructure condition

No	Measures	Number measuring/mentioned
1	Percent of system by condition level	36
2	Number/Percent of bridges by condition level	32
3	Percent of bridges inspected on schedule	5
4	Percent runway/taxiway pavement by condition level	5
5	Roadside Maintenance Quality; Overall Roadway LOS; Highway Maintenance LOS	4
6	LOS - Sign maintenance level	2
7	LOS - Litter and Debris	1
8	LOS - Striping	2
9	LOS - Guardrails	2
10	LOS - Traffic Guidance	2
11	Percent of roadways clear during winter storm (or within x hrs.)	12
12	Percent of roadways with fair+ bicycle level of comfort	4
13	Percent of sidewalks in good+ condition	3
14	Percent of highway system resurfaced	3

15	Shoulder mile improvements	2
16	Percent of rail miles capable of heavy axle trains/speeds over 40mph	4
17	Percent of airports meeting the state standards	2
18	Life remaining in transit vehicles	2
19	National Ranking of transportation infrastructure	1
20	Rest area LOS	2

*) Highlighted in blue: federal performance measurements required to be adopted by states

Congestion Reduction

In terms of congestion reduction, the federal performance measurement solely lists traffic congestion as the measure that states must address. Considering this somewhat unspecified and simplified measure, states have come up with their own performance measures designed to align with the congestion reduction measure (see Table 11). A handful of measures might not be directly related to congestion reduction but had been deemed likely to influence congestion, e.g., 'transit ridership' and 'response time to incidents'.

The aforementioned measures appear to be adopted by a relatively small number of states, at least in comparison with the other six congestion reduction measures, that warrant further description. There were 16 states that measured the response time to incidents and 13 states that measure transit ridership. The measure of response time to incidents also includes duration of delay caused by accident and percent of time delay (<120 or 90 minutes).

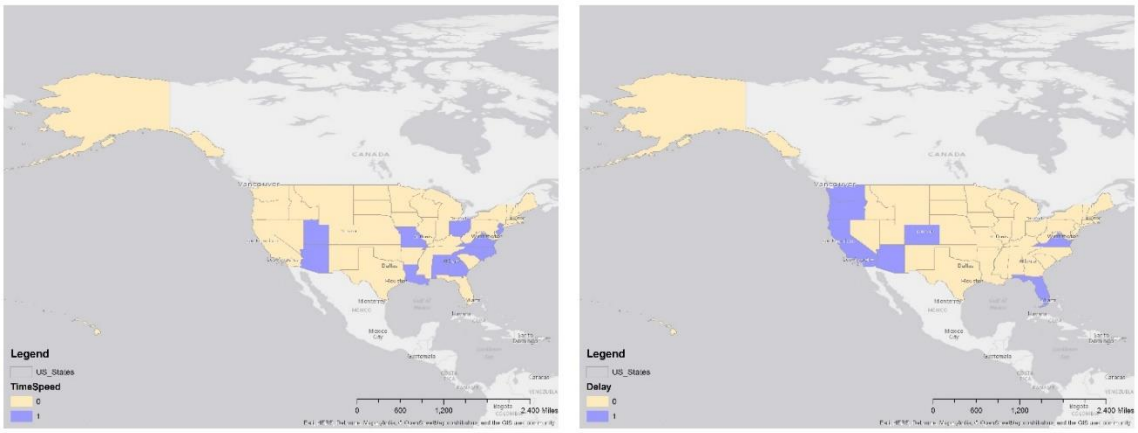
On the other hand, as can be seen in Table 11, there were only a handful number of states that adopted the indicators that seem to be directly related to congestion reduction, such as travel time/speed measure and total hours of delay (as shown in Figure 3), percent of system congested, congestion cost, and percent of roadway congested.

Table 11. Summary of state performance indicators on congestion reduction

No	Measures	Number of measuring/mentioned
1	Travel Time/Speed Measure	10
2	Total hours of delay	7

3	Congestion Cost	2
4	Percent of system congested	6
5	Response time to incidents	16
6	Transit Ridership	13
7	Percent of roadway congested	2
8	Congestion Index / Congestion LOS	5

Figure 3. States that measured travel time/speed (left) and annual travel delay hours (right)



*) Blue: States that had measures; Yellow: States that did not have

In summary, the project team found a variety of measures adopted by states that seemed to be not directly related to traffic congestion but could influence congestion. It should be noted, however, that MAP-21 only required states to address traffic congestion but did not specifying what measures should be utilized in the development of local performance measures.

System Reliability

The goal of system reliability is to improve the efficiency of the surface transportation system. This goal is translated into two primary federal performance measurements: 1) the performance of the Interstate system and 2) performance of the National Highway System (excluding the Interstate system). The project identified that, apparently, those federal performance measurements were not necessarily adopted by states. As can be seen in Table 12, states developed somewhat different measures. For instances, a few number of states have developed measures that revolve around service punctuality, i.e., 'percent transit on-time'. A particular measure that somewhat most directly related to the federal performance

measurement on system reliability was ‘roadway reliability index'; however, there were only three states that adopted such measure. As Table 12 illustrates, there were only four comparable measures across states regarding system reliability. None of them were necessarily align with the federal performance measurement.

It should be noted, however, that indicators in another category might be considered relevant as well to measure system reliability, for example, the indicator of ‘percent of roadways clear during winter storm' that was included in the infrastructure condition category might as well can be considered as system reliability measure.

Table 12. Summary of state performance indicators on system reliability

No	Measures	Number of measuring/mentioned
1	Roadway Reliability Index	3
2	Percent Transit On-Time	6
3	Percent operated scheduled trips	4
4	Number of incidents responded by freeway patrol	3

Freight Movement and Economic Vitality

In terms of freight movement and economic vitality, federal performance measurement requires states to track the freight movement on the interstate. The project identified that the aforementioned measure wasn't practically adopted by almost all states. One particular measure that could be related to the federal performance measurement was ‘large truck VMT' as the proxy of truck activities in particular states, in which there were only two states that tracked that measure as illustrated in Table 13.

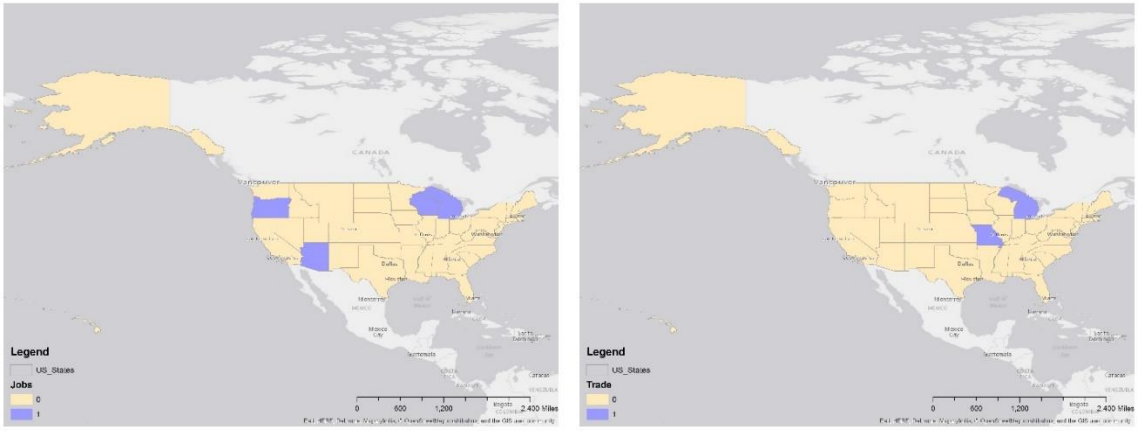
In regards to the economic vitality, in light with the somewhat missing emphasize on economic vitality in federal performance measurement, states implemented their own measures. For instances, a handful number of states measured a number of jobs created/retained as well as a few states that also looked into the ‘percent/amount of US trade through state’ as illustrated in Figure 4.

Overall, the project team noted that most states have not adopted or put into place measures to address the federally-mandated measure to track freight movement. A considerable number of states, however, had put in places the measures related to economic vitality although the federal requirement did not specify such measure.

Table 13. Summary of state performance indicators on freight movement and economic vitality

No	Measures	Number of measuring/mentioned
1	Number of jobs created/retained	6
2	Percent of administrative (and engineering) costs spent on projects	5
3	Large Truck VMT	2
4	Percent/Amount of US trade through state (by mode)	6

Figure 4. States that measured number of jobs created (left) and percent/amount of US trade through the state (right)



*) Blue: States that had measures; Yellow: States that did not have

Environmental Sustainability

In terms of environmental sustainability, there was only one measure required by the federal government, which is states had to track the 'on-road mobile source emissions'. Many states have added additional measures to this category, due in part to the broad definition of environmental sustainability itself and the testament to the inextricable linkage of transportation systems and infrastructure with the environment. For instances, a small number of states evaluated the 'alternative fuel vehicles in the state DOT fleet' as

indicated in Table 14, which might be an indicator that states are aiming to further increase the alternative fuel vehicle portfolio. Some states also consider the 'number of tons of recycled material used in roadway projects'. And depending upon the geographic characteristics, the project noticed 2 states that evaluated the 'acres of wetlands / ratio of mitigated'.

Yet, assessment on environmental sustainability measures as illustrated in Table 13 indicated that there were only a few measures regarding environmental sustainability that have been put in place by states. This finding might seem unfortunate; however, the project also considered that the environmental problems might be state-specific and the common measures comparable across states might not be readily available or have not been implemented yet.

Table 14. Summary of state performance indicators on environmental sustainability

No	Measures	Number of measuring/mentioned
1	Fuel Consumption per registered vehicle	2
2	Alternative fuel vehicles in state DOT fleet	2
3	Number of tons of recycled material used in Roadway Projects	2
4	Average time to complete Environmental Assessments and EIS	2
5	Percent of projects with updated ECR/RTL / in compliance	4
6	Acres of wetlands / ratio of mitigated	2

In summary, it might be considered as a surprise that only a very few states that put in place measure to address federal requirement to track 'on-road mobile source emissions', especially considering the importance of such measure. Yet, it might be due to the condition in which emission tracking was perhaps done by the MPOs.

Reduced Project Delivery Delays

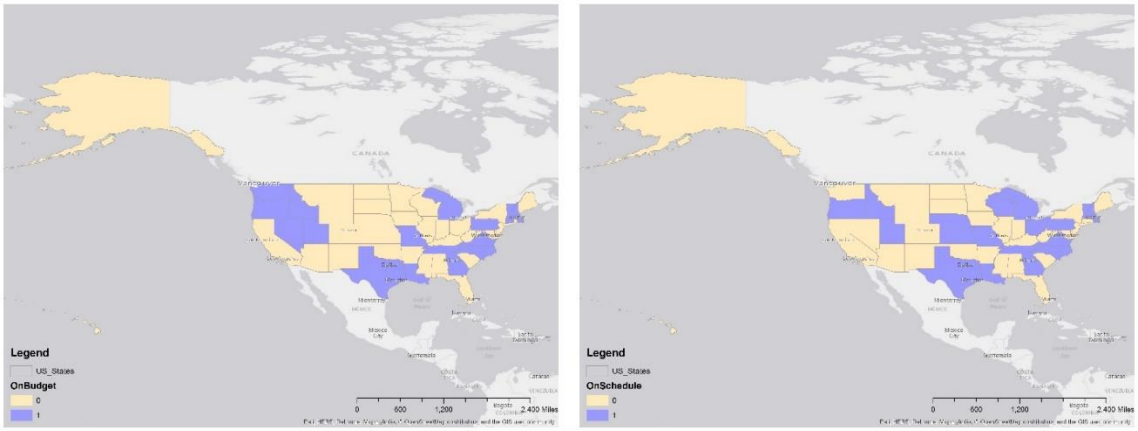
Federal performance measurement did not specify what measure states must adopt in terms of reduced project delivery delays. Nonetheless, the project identified five comparable measures across states (Table

15). Specifically, the project found a great number of states specified the measures of 'percent of projects completed on time/on schedule' and 'percent of projects completed on budget/cost as percent of budget', in which there were 21 and 20 states implemented those measures as illustrated in Figure 5, respectively. It should also be noticed that these measures might not necessarily be adopted by states to comply with the federal performance requirement, but rather as expected measures that have been implemented for years.

Table 15. Summary of state performance indicators on reduced project delivery delays

No	Measures	Number of measuring/mentioned
1	Percent planned ROW delivered / percent parcels secured	3
2	Percent of projects completed on time/on schedule	21
3	Percent of projects completed on budget / cost as percent of budget	20
4	Percent of project bids within estimate	4
5	Value / number of projects awarded for construction	4

Figure 5 States that measured projects delivered on budget (left) and on schedule (right)



*) Blue: States that had measures; Yellow: States that did not have

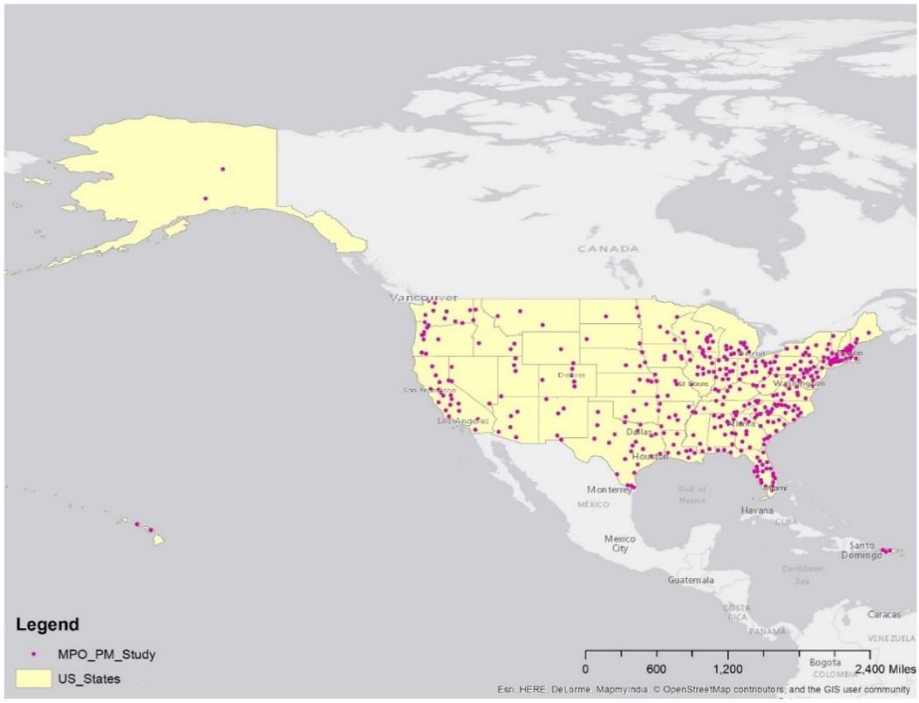
Overall, considering that there was not federally-mandated measure related to reduced project delivery delays, it was reassuring that most states have adopted and implemented the measure to track on-schedule and on-budget projects.

CHAPTER 3.

ANALYSES OF PERFORMANCE MEASURES AT THE MPO-LEVEL

At the MPO-level, performance measures appear to be more detailed than at the state-level. The measures also appear to be further tailored to meet MPO goals. This notion to some extent led to increasing difficulties to identify comparable performances measures across MPOs. Nonetheless, the project had tabulated the measures adopted by MPOs across the nation as the basis to benchmark and track national progress on specific performance indicators at the MPO-level.

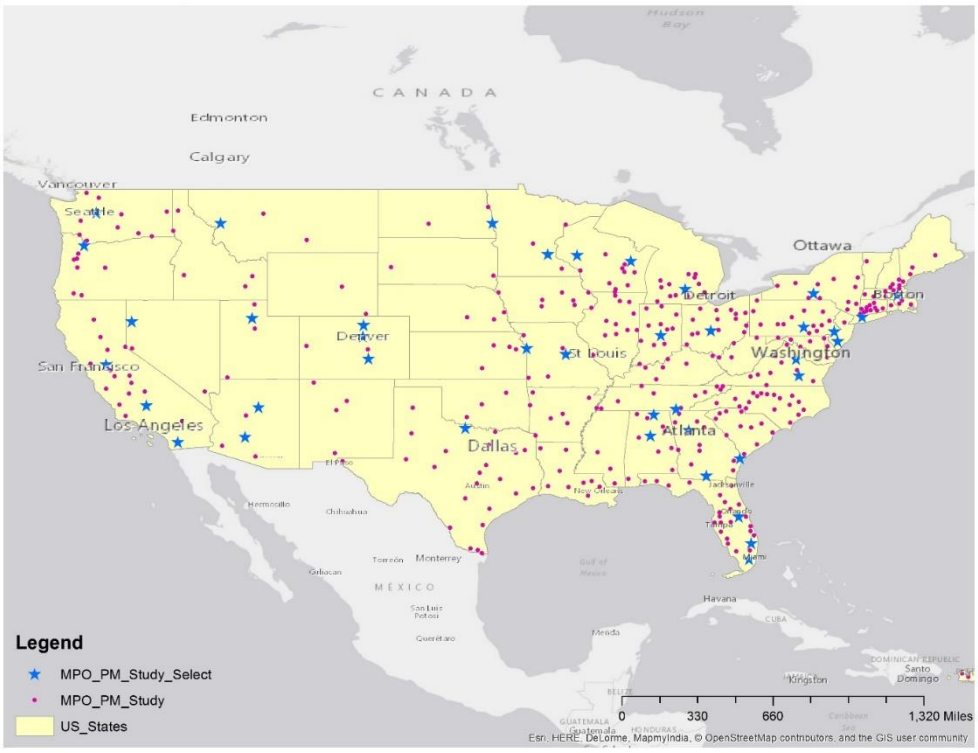
Figure 6. Geographical distribution of MPOs across the U.S.



The project identified 377 MPOs across the country (Figure 6) and selected 40 MPOs as the sample for further detailed studies (Figure 7, also see

Table 17 in Appendices). As expected, the level of detail of the information obtained pertains MPOs' performance measures development status and the measures adopted was somewhat varied (Table 18 and Table 19 in Appendices). Various factors could be associated with this notion, for instances, MPO's planning capacity and resources, data availability, and the inherent characteristics of each MPO and the region. In regards to the seven national programs emphasized in the MAP-21, i.e., safety, infrastructure condition, congestion reduction, system reliability, freight movement and economic vitality, environmental sustainability, and reduced project delivery delays, this following section assess how MPOs across the country had adopted measures relevant to the seven areas as emphasized in MAP-21.

Figure 7. Forty MPOs selected for detailed studies



Safety

In terms of safety, the project identified 163 performance indicators adopted across the 40 MPOs being studied. These indicators are to some extent appeared to be a more detailed and further tailored version of

the national performance measures required by the federal government, which centered around the number of fatalities and serious injuries. For instances, while the MAP-21 national programs on safety didn't specify what modes involved in the accidents and crashes, a substantial number of MPOs further specified the modes and developed the measures based on a particular mode.

An example of mode-specific measures would be bicycle and pedestrian that a multitude of MPOs has put emphasizes on. To name a few MPOs, New York Metropolitan Transportation Council measured the 'number of bicycle fatalities per year'; Tri Cities Area MPO in Virginia calculated the 'number of bicycle crashes and pedestrian injuries in crashes' and 'number of bicycle and pedestrian fatalities'; Puget Sound Regional Council also put emphasize on bicyclists through the measures of 'Bicycle/Pedestrian Fatalities by population' and 'Bicycle/Pedestrian Serious Injuries by population'.

Other aspects of safety that MPOs have put emphasize on was transit safety. New York Metropolitan Transportation Council, Transportation Commission (RTC) of Washoe County in Nevada, Fredericksburg Area MPO in Virginia are among MPOs that put measures pertain transit safety. The case of Fredericksburg Area MPO was also particularly interesting since the MPO also implemented measures on aviation-related crashes and injuries.

Performance measures on safety appear to have been adopted fairly extensively by the MPOs. The measures seem to be more detailed than the state and federal-mandated performance measures and further tailored to meet MPO goals and characteristics.

Infrastructure Condition

In terms of infrastructure condition, the performance measures adopted and implemented by MPOs tend to revolve around maintaining and improving facilities quality, which includes roads (National Highway System, state roads, interstate, arterials), pavement, bridges, transit corridors, bicycle network, among

others. The most common indicator to represent the condition was percentage, e.g., percent of pavement in good condition, percent of structurally deficient and functionally obsolete bridges, percent of miles of deficient pavement by roadway type.

In addition to the comparable measures on infrastructure condition that appear somewhat similar across MPOs, the project identified some measures that could be considered as MPO-specific given its geographic characteristics. For instances, 'ferry and HTC terminal conditions', 'preventive maintenance of transit rolling stock and facilities', '% bridges meeting seismic standards', among other measures.

Congestion Reduction

Congestion reduction measures adopted by the MPOs could be categorized into two types of performance measures: 1) measures pertain and related to the congestion itself and 2) programs implemented to alleviate and reduce congestion. On the one hand, measures pertain the congestion were somewhat self-explanatory, for instance, a multitude of MPOs have adopted measure regarding hours of delay, average speed during congested times based on types of infrastructure (e.g., roadways, arterials, freeways), average level of congestion in hours, among others. On the other hand, programs implemented to contribute to alleviating congestion appear to be mostly related to reducing automobile travels, for instances, new miles of sidewalks, new miles of bicycle activities, transit ridership, reduction in vehicle miles of travel (VMT) and vehicle hours of travel (VHT).

While the measures to address congestion appear to be relatively widely adopted across MPOs, there is a variation of how MPOs put emphasizes to address the issue. This notion stems from the circumstance in which problems with congestion are different across regions. Even more so, congestion might not be of concerns in certain regions and MPOs. Indeed, the project noticed that not all MPOs put forward measures to reduce congestion, partly because congestion was not considered severe enough that would

warrant specific measures to be adopted. Yet, congestion reduction remains a priority program in a multitude of MPOs. The MAP-21 was likely to further accentuate the needs to address congestion.

System Reliability

System reliability measures at the MPO-level appear to be more detailed than at the state level. As discussed in the narrative regarding performance measures at the state level, there were four comparable measures across states: roadway reliability index, percent transit on-time, percent operated scheduled trips, number of incidents responded by freeway patrol. MPOs appear to further detail the system reliability measures by specifying the system types, improvements made and planned to ensure system reliability, and other specific measures tailored to meet MPO goals and objectives.

In terms of reliability of specific system, a multitude of MPOs evaluated how certain infrastructure and facilities perform. For instances, Boston Region MPO evaluated transit reliability by conducting performance tracking on the transit agency's bridges, subway elevators/escalators, track and signal performance.

Some MPOs appear to adopt measures on the improvements made and planned to ensure system reliability across users. The Capital Area MPO in Missouri specified the measure of 'bike/pedestrian and ADA transition plan improvements', which might be indicative that system reliability should not solely focused on the systems that geared to cater automobile. Mid-America Regional Council, a bi-state MPO in Missouri and Kansas, also implemented measure designed specifically to ensure bicycle and pedestrian accessibility.

Other MPOs put forward programs to ensure transportation reliability during adverse weather condition, for example, the Capital Area MPO in Missouri through the measure of 'time to meet winter storm event performance objectives'.

Freight Movement and Economic Vitality

Measures pertain freight movement and economic vitality appears to be widely adopted by MPOs. The project identified 94 measures related to freight and economic vitality adopted across the 40 MPOs studied. These measures appear to be centered upon facilitating reliable freight movement and providing and expanding job opportunities. As expected, the measures adopted at the MPO-level appear to be more detailed than at state-level.

To facilitating reliable freight movement, a considerable number of MPOs evaluated the freight movement and volume, such as Missoula City-County Office of Planning and Grants in Montana that tracked the ‘freight movement on the interstate' and New York Metropolitan Transportation Council in New York that considered the ‘freight volume by mode'. Connectivity between industrial and commercial properties with the transportation infrastructure also has of particular concern for some MPOs, for instances, the Fargo-Moorhead Metropolitan COG in North Dakota put forward measure aimed to enable ease of movement of goods and freight to commercial industrial centers. Transportation Commission (RTC) of Washoe County in Nevada specified the need to meet certain level of service at Interstate-80 to facilitate freight and goods movement. Franklin County MPO in Pennsylvania adopted measure to ‘increase in improved freight access for industrial properties' and specified the target of ‘80% of new industrial land development has direct access to existing freight infrastructure (major collector/arterial roads, rail facilities, etc.).

The project also found measures that could be considered as overlap between congestion reduction and freight movement and economic vitality. An example would be the measure put forward by Metro in Oregon that evaluated ‘congestion by location of freight networks that exceed level of service thresholds in mid-day' and ‘congestion by location of freight networks that exceed level of service thresholds in PM

peak'. Another example is the measure adopted by Chattanooga MPO in Tennessee to evaluate the 'annual congestion costs, truck and auto' in order to 'reduce delay on critical freight corridors'.

Similar to the measures on freight movement, the 40 MPOs studied appear also to put great emphases on the measures regarding economic vitality. One particular aspect that a great majority of MPOs have been taking into account was job creation, particularly as the effects of transportation infrastructure. MPOs have put forward a variety of programs related to job creation. For instances, San Diego Association of Government in California adopted the measure to evaluate 'job impacts average number per year'. Similarly, San Joaquin COG, also in California, implemented the measures to assess 'job creation: number of direct and indirect jobs' as well as transportation-specific under the measure of 'job creation: direct, indirect and induced employment from transportation'. METROPLAN Orlando also adopted a similar measure by evaluating 'jobs created as a result of transportation investment'.

As expected, job creation was not the only aspect pertain economic vitality. A great majority of MPOs have also specified other measures to facilitating robust regional economic development, which includes assessment of certain aspects that might not directly link to transportation but nonetheless important for the health of region's economic, such as labor, educational attainment, and household expenditure.

Environmental Sustainability

Following the pattern of previously discussed MAP-21 programs, performance indicators on environmental sustainability at MPO-level appear more to be more detailed than at the state level. This notion likely stems from the circumstance in which MPO, not state, is the organization that have greater control over the environmental conformity in the region, particularly regarding the land use.

As expected, there is a great variety of measures on environmental sustainability across MPOs, most of the measures are centered upon evaluating the pollutant substances in the MPO region. For instances, a

multitude of MPOs assessed air quality through evaluating GHG emissions, CO, CO2, HC, NOx, Ozone, PM10, PM2.5, VOC, among others.

While the type of measures as described previously could be considered as assessment of the pollutants themselves, there are measures that deal with the factors that influence the amount of pollution. Measures that fall into this category include, for example, ‘vehicle miles traveled’, ‘number of personal vehicles per household / number of households’, ‘percentage of commuters driving alone’, ‘surface coverage of transportation system on acres of wetlands’, among other measures.

Reduced Project Delivery Delays

In terms of programs on reduced project delivery delays, it appears a multitude of MPOs did not adopt such particular programs. A few numbers of MPOs that specified programs within the national goal on reduced project delivery delays are, for example, Pueblo Area COG MPO in Colorado and Ithaca-Tompkins County Transportation Council in New York. Pueblo Area COG MPO put forward programs aimed at contribution to reducing project delivery delays, for instance, ‘improve timing to streamline approval processes, including reviews, contracts, and general clearances' and ‘when possible do not require design and construction funding and having separate consultants for design/construction to be split up'. Ithaca-Tompkins County Transportation Council evaluated the ‘average number of years between first inclusion in the TIP and funds obligated for the final phase of the project'.

This circumstance in which not a great majority of MPOs specified programs on reduced project delivery delays likely stems from the inherent characteristic of most MPOs that do not execute transportation infrastructure projects themselves. Instead, the primary role of MPO, as the name suggests, is to conduct planning in particular metro or region. To this end, it might be understandable that there were only a few MPOs specified programs on reduced project delivery delays.

CHAPTER 4.

POLICY IMPLICATIONS

This report provides a comprehensive analysis of performance measures at the state- and MPO-level and illustrates the steps states and MPOs have taken to develop and implement transportation system performance measures. The analyses were conducted on a sectoral basis following the seven aspects that the MAP-21 put emphasizes: 1) safety, 2) infrastructure condition, 3) congestion reduction, 4) system reliability, 5) freight movement and economic vitality, 6) environmental sustainability, and 7) reduced project delivery delays.

At the state-level, the project team found a considerable number of states have adopted performance measures consistent with the federal legislation. However, it was found that many states have not put forth a set of performance measures that meet the federal standards. While a variety of factors may have contributed to a lack of universal adoption of the recommended measures, a review of all available official agency documents and reports dated up until the year 2013 did not reveal any systematic underlying cause for the implementation delay. Moreover, many measures that are deemed to be basic indicators of system performance and meet federal standards such as measuring 'number of crashes' or tracking 'percent of roadway congested' were not readily reported by these states.

At the MPO-level, a much wider variety of measures were found across each agency. This diversity in measures made it difficult to compare the development and implementation of the performance measures across MPOs. Nonetheless, a few patterns were identified including an abundance of congestion related measures and in contrast to state-level measures, a great deal of variety in implementing freight and environmental sustainability measures.

Based on the analyses of performance measures at the state- and MPO-level as described, we suggest four policy enhancements based approaches to ensure a greater number of state and MPO develop and implement performance measures consistent with MAP-21 guidelines.

1) *Ensure coherent and synchronized performance measures across federal, states, and MPOs*

A lengthy description in the preceding sections suggests a considerable number of states and MPOs have not adopted performance measures consistent with MAP-21 requirements. We suggest there is a need to ensure coherent and synchronized performance measures across federal, states, and MPOs through more detailed guidance on the ways in which each performance measure should be calculated. This additional guidance is likely to be more effective if it is not from the top down relying upon an elaboration of federal requirements, but rather as guidelines developed by state and MPOs. Ideally, agencies should caucus to establish a set of best practices drawing from the significant work by many DOTs and MPOs to establish performance measures in the absence of more detailed federal regulations. Our analysis showed there were a number of cases where DOTs instituted a comprehensive set of performance measures prior to any federal requirements, e.g., Virginia DOT evaluated system performances with a detailed set of performance measures applied well ahead of the MAP-21 performance requirement (Eisele et al., 2015).

2) Implement target-setting performance measures

Analyses of performance measures as described throughout this report indicate that while a number of states and MPOs have implemented measures consistent with the requirement outlined in MAP-21, very few of the measures utilized a target-setting approach. The database of performance measures developed for this projects show that of the 64 performance measures tracked at the state-level (see Table 16 in Appendices) just 74% set targets for improvement. The importance of the target-setting approach stems from the inherent characteristic of performance measures, which are intended to provide benchmarks from which past and future investment can be evaluated. All performance measures should therefore have an associated target level.

3) Recognition of unique local circumstances

Ensuring coherent performance measures across federal, states, and MPOs should not come at the expense of setting measures that are consistent with local circumstances. Recognizing differences in local circumstances that may lead to a unique set of performance measures is critical to the widespread adoption of target-setting performance measures. Performance targets should be set at the local-level with flexibility to shape the standards given the unique set of challenges, opportunities, and desired goals/objectives across communities and geographies (Eisele et al., 2015).

4) Provide more federal technical assistance to develop performance measures

Implementing target-setting performance measures would likely require comprehensive system performance analyses. The analyses should allow real-time, streamlined reporting, and data-driven approaches to tracking the targets. However, achieving comprehensive system performance analyses would require considerable human, technological, and financial resources which many state DOTs and MPOs may not be able to provide. A greater level of federal technical assistance may be required by jurisdictions that do not have staff that can formulate and monitor target-based measures. A lack of freight and environmental measures at the state level is an indication that a greater level of federal technical assistance more aid in a broader adoption of performance measures.

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Appendices

Table 16. Tabulated database of state performance measures

Category	Measures	# Mentioned	# with Targets
Safety	# of Crashes	12	7
Safety	# of Fatalities	27	17
Safety	# of Fatalities per 100MVMT	21	17
Safety	# of Serious Injuries	17	10
Safety	# of Serious Injuries per 100MVMT	4	3
Safety	# of crashes with impaired drivers	4	3
Safety	# of workzone incidents	9	4
Safety	# of non-motorized (pedestrian and/or bike)	7	3
Safety	# of unrestrained fatalities	6	5
Safety	Worker Incident Rate - injuries/illnesses	12	10
Safety	% seatbelt usage	11	9
Safety	Transit Safety measures (accident, injury, fatality rates)	4	3
Safety	# of fatalities/injuries from at grade rail	4	2
Safety	Seat Belt Citations Issued	3	2
Safety	Impaired driving arrests made	3	1
Safety	Speeding citations issued	3	2
Safety	# of commercial vehicle safety inspections	2	1
InfrCond	% of system by condition level	36	29
InfrCond	#/% of bridges by condition level	32	28
InfrCond	% of bridges inspected on schedule	5	4
InfrCond	% runway/taxiway pavement by condition level	5	5
InfrCond	Roadside Maintenance Quality; Overall Roadway LOS; Highway Maintenance LOS	4	4
InfrCond	LOS - Sign maintenance level	2	2
InfrCond	LOS - Litter and Debris	1	1
InfrCond	LOS - Striping	2	2
InfrCond	LOS - Guardrails	2	2
InfrCond	LOS - Traffic Guidance	2	1
InfrCond	% of roadways clear during winter storm (or within x hrs.)	12	9
InfrCond	% of roadways with fair+ bicycle level of comfort	4	4
InfrCond	% of sidewalks in good+ condition	3	2
InfrCond	% of highway system resurfaced	3	2
InfrCond	Shoulder mile improvements	2	2
InfrCond	% of rail miles capable of heavy axle trains/speeds over 40mph	4	4
InfrCond	% of airports meeting the state standards	2	2
InfrCond	Life remaining in transit vehicles	2	1
InfrCond	National Ranking of transportation infrastructure	1	0

Category	Measures	# Mentioned	# with Targets
InfrCond	Rest area LOS	2	2
CongRed	Travel Time/Speed Measure	10	4
CongRed	Total hours of delay	7	4
CongRed	Congestion Cost	2	2
CongRed	% of system congested	6	1
CongRed	Response time to incidents	16	12
CongRed	Transit Ridership	13	13
CongRed	% of roadway congested	2	2
CongRed	Congestion Index / Congestion LOS	5	5
SysRel	Roadway Reliability Index	3	1
SysRel	% Transit On-Time	6	6
SysRel	% operated scheduled trips	4	3
SysRel	# of incidents responded by freeway patrol	3	1
Freight&EconVital	# of jobs created/retained	6	4
Freight&EconVital	% of administrative (and engineering) costs spent on projects	5	4
Freight&EconVital	Large Truck VMT	2	2
Freight&EconVital	%/# of US trade through state (by mode)	6	4
EnviSust	Fuel consumption per registered vehicle	2	0
EnviSust	Alternative fuel vehicles in state DOT fleet	2	2
EnviSust	# of tons of recycled material used in Roadway Projects	2	2
EnviSust	Average time to complete Environmental Assessments and EIS	2	1
EnviSust	% of projects with updated ECR/RTL / in compliance	4	4
EnviSust	Acres of wetlands / ratio of mitigated : filled	2	1
RedProjDelivDelays	% planned ROW delivered / % parcels secured	3	2
RedProjDelivDelays	% of projects completed on time/on schedule	21	16
RedProjDelivDelays	% of projects completed on budget / cost as % of budget	20	16
RedProjDelivDelays	% of project bids within estimate	4	3
RedProjDelivDelays	Value / # of projects awarded for construction	4	3

*) InfrCond: Infrastructure condition; CongRed: Congestion reduction; SysRel: System reliability; Freight&EconVital: Freight movement and economic vitality; EnviSust: Environmental sustainability; RedProjDelivDealys: Reduced project delivery delays

Table 17. List of 40 MPOs selected for detailed analyses

STATE	CITY	MPO NAME
AL	Birmingham	Birmingham MPO
AL	Huntsville	Huntsville Area Transportation Study
AZ	Phoenix	Maricopa Association of Governments
AZ	Flagstaff	Flagstaff MPO
CA	San Diego	San Diego Association of Governments
CA	Bakersfield	Kern COG
CA	Stockton	San Joaquin COG
CO	Denver	Denver Regional COG
CO	Fort Collins	North Front Range MPO
CO	Pueblo	Pueblo Area COG MPO and TPR
FL	Miami	Miami-Dade MPO
FL	West Palm Beach	Palm Beach MPO
FL	Orlando	METROPLAN Orlando
GA	Valdosta	Valdosta-Lowndes MPO
GA	Savannah	Coastal Region MPO
GA	Atlanta	Atlanta Regional Commission
IN	Indianapolis	Indianapolis MPO
MA	Boston	Boston Region MPO
MI	Lansing	Tri-County Regional Planning Commission
MN	St. Paul	Metropolitan Council
MO	Jefferson City	Capital Area MPO
MO	Kansas City	Mid-America Regional Council
MT	Missoula	Missoula City-County Office of Planning and Grants
ND	Fargo	Fargo-Moorhead Metropolitan COG
NJ	Vineland	South Jersey Transportation Planning Organization
NV	Reno	Transportation Commission (RTC) of Washoe County
NY	Ithaca	Ithaca-Tompkins County Transportation Council
NY	New York	New York Metropolitan Transportation Council
OH	Columbus	Mid-Ohio Regional Planning Commission
OR	Portland	Metro
PA	Harrisburg	Harrisburg Area Transportation Study
PA	Philadelphia	Delaware Valley Regional Planning Commission
TN	Chattanooga	CHCNGTPO
TX	Wichita Falls	Wichita Falls MPO
UT	Salt Lake City	Wasatch Front Regional Council
VA	Petersburg	Tri Cities Area MPO
VA	Fredericksburg	Fredericksburg Area MPO
WA	Seattle	Puget Sound Regional Council
WI	Eau Claire	Chippewa-Eau Claire MPO
WI	Green Bay	Green Bay MPO

Table 18. Tabulated database of MPOs performance measures (Based on analyses of 40 MPOs)

Category	Measures
Safety	Number of Crashes
Safety	Number of Fatalities
Safety	Number of Fatalities per 100MVMT
Safety	Number of Serious Injuries
Safety	Number of Serious Injuries per 100MVMT
Safety	Number of crashes with impaired drivers
Safety	Number of workzone incidents
Safety	Number of non-motorized (ped and/or bike)
Safety	Number of unrestrained fatalities
Safety	Worker Incident Rate - injuries/illnesses
Safety	Percent seatbelt usage
Safety	Transit Safety measures (accident, injury, fatality rates)
Safety	Number of fatalities/injuries from at grade rail
Safety	Seat Belt Citations Issued During Grant-Funded Enforcement Activities
Safety	Impaired driving arrests made During Grant-Funded Enforcement Activities
Safety	speeding citations issued During Grant-Funded Enforcement Activities
Safety	Number of commercial vehicle safety inspections
Safety	Crash / injury / fatality rate
Safety	Intersection crash ranking
Safety	Annualized Accident Statistics for Annual Average Daily Traffic
Safety	Collision Rate: Statewide Accident Rate multiplied by VMT
Safety	Reduce the fatal crash rate by 50%
Safety	Decrease the “serious” injury crash rate by 25%
Safety	Decrease the injury crash rate by 25%
Safety	Decrease the PDO rate of crashes by 25%

Category	Measures
Safety	Decrease the frequency and severity of public transit related crashes by 10%
Safety	Decrease the frequency and severity of pedestrian related accidents by 75%
Safety	Eliminate railroad crossing related crashes by 75%
Safety	Enhance the overall safety of the transportation system by implementing engineering, education, and enforcement strategies to reduce traffic-related injuries and fatalities.
Safety	Reduce the number and severity of truck/freight related crashes by 75% on the New Pueblo Freeway (NAFTA corridor – designated national freight movement corridor) interstate system
Safety	Reduce the number and severity of truck/freight related crashes by 75% on U.S. highways and other NHS highways
Safety	Improve all functionally obsolete interchanges, accel/decel lanes, inadequate ramp lengths, inadequate shoulders to AASHTO standards for the safe and efficient movements of freight through Pueblo County's interstate system
Safety	Sustain and improve a regional roadway system that provides local, regional and statewide efficient access and connectivity for the movement of freight and people
Safety	Crash Rate Per Million Vehicle Miles Traveled
Safety	Percent of all regional crashes with an identified PLAN 2040 Update project
Safety	Percent of PLAN 2040 Update projects that intersect above average crash rate facilities
Safety	Total accidents per million miles traveled, involving all user types
Safety	Injury accidents per million miles traveled, involving all user types
Safety	Fatal accidents per million miles traveled, involving all user types
Safety	Implementation of transit and other safety projects
Safety	Number of increased bike and pedestrian facilities
Safety	Number of at-grade crossings reduced
Safety	Hurricane evacuation route status
Safety	Improved emergency responses (e.g., ambulance travel times to hospitals)
Safety	Maximize transportation system mobility during disruptive events (such as reductions in time to clear major crashes from through lanes)
Safety	Reduction in vulnerability of the transportation system (such as Implementation of monitoring infrastructure for major transportation system)
Safety	Fatality Rate
Safety	Traffic fatalities per 100 million VMT

Category	Measures
Safety	Automobile fatalities (per 100 million VMT)
Safety	Truck fatalities (per 100 million VMT)
Safety	Bicyclist fatalities (per 100,000 residents)
Safety	Pedestrian fatalities (per 100,000 residents)
Safety	Fatalities
Safety	Number of traffic fatalities
Safety	Automobile fatalities
Safety	Truck fatalities
Safety	Bicyclist fatalities
Safety	Pedestrian fatalities
Safety	Serious Injuries (hospital stays for nonfatal injuries)
Safety	Number of traffic serious injuries
Safety	Automobile serious injuries
Safety	Truck serious injuries
Safety	Bicyclist serious injuries
Safety	Pedestrian serious injuries
Safety	Serious Injury Rate (hospital stays for nonfatal injuries)
Safety	Serious injuries per 100 million VMT
Safety	Automobile serious injuries (per 100 million VMT)
Safety	Truck serious injuries (per 100 million VMT)
Safety	Bicyclist serious injuries (per 100,000 residents)
Safety	Pedestrian serious injuries (per 100,000 residents)
Safety	HSIP Clusters for all modes (High Crash Locations based on EPDO index)
Safety	Number of TIP projects that have a major safety component
Safety	crash reduction factors by type of crash
Safety	crashes per million entering vehicles (intersections)

Category	Measures
Safety	crashes per million vehicle miles (roadways)
Safety	annual net reduction in crashes, injuries and fatalities per capita of regional, county or
Safety	reduction in crashes involving bicycles or pedestrians
Safety	air cargo tonnage
Safety	Number and rate of fatalities and serious injuries
Safety	Number of vulnerable roadway user fatalities and serious injuries
Safety	Number of fatalities and serious injuries resulting from the most frequent crash causes
Safety	Number of fatalities and serious injuries in work zones
Safety	Percent of safety belt/passenger vehicle restraint use
Safety	Number of commercial motor vehicle crashes resulting in fatalities and serious injuries
Safety	Number of lost workdays
Safety	Total and rate of MoDOT recordable incidents
Safety	General liability claims and costs
Safety	Crash fatalities: Number of annual crash fatalities
Safety	Crash fatalities: Number of annual crash fatalities per 100,000,000 Vehicle miles traveled
Safety	Disabling injuries: Number of annual disabling injuries
Safety	Disabling injuries: Number of annual disabling injuries per 100,000,000 vehicle miles traveled
Safety	1. Rate of serious injuries per 100 million vehicle miles traveled (VMT)
Safety	2. Rate of fatalities per 100 million
Safety	3. Number of serious injuries
Safety	4. Number of fatalities
Safety	Preventable transit accidents per 100,000 miles of service
Safety	Number of crashes (vehicle, bike, pedestrian)/Number of crashes per Vehicle Miles Travelled (VMT)
Safety	Number of serious injuries per VMT
Safety	Number of fatalities (vehicle, bike, pedestrian)/Number of fatalities per VMT
Safety	Miles of bicycle lanes added & percent of Bicycle Pedestrian Master Plan completed

Category	Measures
Safety	Miles of sidewalks added or enhanced & percent of ADA Transition Plan completed
Safety	Number of average annual crash fatalities in the last five years
Safety	Number of average annual crash fatalities per VMT in the last five years
Safety	Number of average annual serious injuries in the last five years
Safety	Number of average annual serious injuries per VMT in the last five years
Safety	Number of average annual bicycle / pedestrian crashes in the last five years
Safety	Number of average annual bicycle / pedestrian crashes with serious injuries in the last five years
Safety	Number of bicycle / pedestrian fatalities
Safety	Annual Crashes
Safety	Annual Crashes Resulting in Fatality
Safety	Annual Crashes Resulting in Injury
Safety	Annual Crashes Resulting in Property Damage
Safety	Number of Bicycle Fatalities Per Year
Safety	Number of Pedestrian Fatalities Per Year
Safety	Number of Transit Accidents Per Year
Safety	Number of Transit Accidents Resulting in Fatality Per Year
Safety	Number of Transit Accidents Resulting in Injury Per Year
Safety	Number of Vehicles Involved in Crashes by Crash Type Per Year
Safety	Number of crashes per million vehicle miles traveled (VMT), on collector or above roadways, for all travelers
Safety	Number of Crashes Per-Capita Travel Region-Wide All Modes
Safety	Number of Fatalities Per-Capita Travel Region-Wide All Modes
Safety	Number of Serious Injuries Per-Capita Travel Region-Wide All Modes
Safety	Decrease 5-year average fatalities
Safety	Decrease 5-year average major injury crashes
Safety	Decrease 5-year average pedestrian and bicycle crashrelated injuries
Safety	Decrease 5-year average of crashes involving horse and buggy

Category	Measures
Safety	Total Crashes/VMT
Safety	Fatalities/VMT
Safety	Injury Crashes/VMT
Safety	Bike/Ped Crashes
Safety	Annual Crashes
Safety	Number of Projects (and Total Funding) Addressing RTP Safety Areas
Safety	Air quality
Safety	Crashes
Safety	Active transportation: walking and cycling
Safety	Crash Rate On Roads in which Roadway and Public Transit Projects are Proposed
Safety	Number of Highway Fatalities and Fatality Rate per 100 million VMT
Safety	Number of Highway Crashes and Crash Rate per 100 million VMT
Safety	Number of Transit Crashes and Fatalities
Safety	Annual Transit Crashes per 100 million PMT
Safety	Annual Transit Injuries per 100 million PMT
Safety	Annual Transit Fatalities per 100 million PMT
Safety	Number of Aviation Crashes and Fatalities
Safety	Annual Aviation Crashes
Safety	Annual Aviation Fatalities
Safety	Annual serious injuries by mode & mode share (Target Zero) - bike & ped separate
Safety	Annual fatalities by mode & mode share (Target Zero) - bike & ped separate
Safety	Fatalities per 100 million VMT (mode & mode share) (5 year rolling average)
Safety	Serious Injuries per 100 million VMT (mode & mode share) (year rolling average)
Safety	Bicycle/Pedestrian Fatalities by population* (separate bike/ped, mode & share) (5 year rolling average)
Safety	Bicycle/Pedestrian Serious Injuries by population* (separate bike/ped, modes & share) (5 year rolling average)
Safety	Safety Project Tracking (Target zero, TIP, by mode, grade crossings)

Category	Measures
Safety	Personal Safety (Public opinion polls*, NTD reported transit crime data)
Safety	Security Project Tracking (level of investment) (resiliency/redundancy) (% Bridges meeting seismic standards)
Safety	Indicators: Total Crashes, Total Fatal Crashes, Total Severe Injury Crashes
Safety	Accident Rate: Per 100,000 VMT
Safety	Level of Investment in Safety Projects
Safety	Number of Accidents
Safety	Reduction in crashes involving school children
Safety	Safety audits completed
Safety	Participating schools
Safety	Number of projects or physical improvements completed to improve safety (sidewalks, signs)
Safety	Weighted evaluation criteria (to be developed)
InfrCond	Percent of system by condition level
InfrCond	Number/Percent of bridges by condition level
InfrCond	Percent of bridges inspected on schedule
InfrCond	Percent runway/taxiway pavement by condition level
InfrCond	Roadside Maintenance Quality; Overall Roadway LOS; Highway Maintenance LOS
InfrCond	LOS - Sign maintenance level
InfrCond	LOS - Litter and Debris
InfrCond	LOS - Striping
InfrCond	LOS - Guardrails
InfrCond	LOS - Traffic Guidance
InfrCond	Percent of roadways clear during winter storm (or within x hrs.)
InfrCond	Percent of roadways with fair+ bicycle level of comfort
InfrCond	Percent of sidewalks in good+ condition
InfrCond	Percent of highway system resurfaced

Category	Measures
InfrCond	Shoulder mile improvements
InfrCond	Percent of rail miles cpabale of heavy axle trains/speeds over 40mph
InfrCond	Percent of airports meeting the state standards
InfrCond	Life remaining in transit vehicles
InfrCond	National Ranking of transportation infrastructure
InfrCond	Rest area LOS
InfrCond	Achieve 80% High/Moderate Drivability Life for the Interstate Highway System based on condition standards and treatments set for traffic volume categories.
InfrCond	High/Moderate Drivability Life for the National Highway System based on condition standards and treatments set for traffic volume categories.
InfrCond	Achieve 80% High/Moderate Drivability Life for the State Highway System based on Condition standards and treatments set for traffic volume categories.
InfrCond	Percent of pavement in good condition
InfrCond	Percent of bridges in good condition
InfrCond	Structurally deficient bridges
InfrCond	Bridge Health Index: ratio of the current condition of each element to its perfect condition
InfrCond	Pavement condition: PSR ranks pavement on a fivepoint scale from very poor to excellent
InfrCond	Number of regional structurally deficient bridges
InfrCond	Number of regional functionally obsolete bridges
InfrCond	Number of regional bridges on state critical bridge list
InfrCond	Pavement condition ratings, such as the Ride Quality Index or PASER rating
InfrCond	Number and percent of miles on the regional federal aid system in fair and good condition
InfrCond	Percent of major highways in good condition
InfrCond	Percent of minor highways in good condition
InfrCond	Condition of state bridges
InfrCond	Percent of structurally deficient deck area on National Highway System
InfrCond	Bridge conditions: Percent of structurally deficient bridges

Category	Measures
InfrCond	Bridge conditions: Percent of functionally obsolete bridges
InfrCond	Pavement condition: Percent of Kansas roads in MARC region classified as “poor” condition
InfrCond	Pavement condition: Percent of Missouri roads in MARC region classified as “not good” condition
InfrCond	Pavement condition on the Interstate system
InfrCond	Pavement condition on the non-Interstate NHS
InfrCond	Bridge condition on the NHS
InfrCond	Pavement Condition Index for Regional Roads
InfrCond	Preventive maintenance of transit rolling stock and facilities
InfrCond	Maintain industry standard vehicle life cycle
InfrCond	% of structurally deficient bridges
InfrCond	Number of miles of State roads in Tompkins County in 'poor' condition
InfrCond	Percentage of structurally deficient and/or functionally obsolete bridges
InfrCond	Percentage of lane miles of streets (collectors and above) with unacceptable pavement conditions, based on ODOT ratings
InfrCond	Reduce the number of structurally deficient bridges
InfrCond	Reduce the percentage of structurally deficient bridge deck area
InfrCond	Reduce poor IRI on roadways to meet statewide goals
InfrCond	Maintain good & excellent OPI on roadways
InfrCond	International Roughness Index (IRI)
InfrCond	Structurally Deficient (SD) or Functionally Obsolete (FO)
InfrCond	Average bus fleet age
InfrCond	Pavement: Percent Lane Miles in Good/Fair Condition
InfrCond	Bridge: Average Health Index
InfrCond	Pavement Conditions by facility type (NHS, SR, interstate, arterials, bicycle network, transit corridors, WA State Truck Freight Economic Corridors)
InfrCond	Pavement Conditions % of network in good, fair, poor condition (NHS, SR, interstate, arterials, bicycle network, transit corridors, WA State Truck Freight Economic Corridors)
InfrCond	Locations of heavy loads on roadways (freight & transit) - predictive - where are we going to need to invest?

Category	Measures
InfrCond	Bridge Conditions - SD & FO rating (NHS, SR, interstate, local, transit corridors, WA State Truck Freight Economic Corridors)
InfrCond	% Bridges with weight restrictions on functionally classified routes
InfrCond	% Bridges meeting seismic standards
InfrCond	Avg. age (surface life) of fleets (bus, ferry, rail)
InfrCond	Ferry and HCT Terminal Conditions
InfrCond	Indicator: Pavement condition – number of miles and percent of total miles in each category
InfrCond	Indicator: Structure Condition – Sufficiency Rating
InfrCond	In priority, (1) Interstate, (2) NHS and U.S. State highways, and (3) all other State highways: - Improve the SR rating of interstate, NHS, and U.S. State highway bridges to a range of 75 to 100 - Improve the SD rating of all other State highway
InfrCond	Percent Bridges Rated as Deficient
InfrCond	Percent Miles of Deficient Pavement by Roadway Type
CongRed	Travel Time/Speed Measure
CongRed	Total hours of delay
CongRed	Congestion Cost
CongRed	Percent of system congested
CongRed	Response time to incidents
CongRed	Transit Ridership
CongRed	Percent of roadway congested
CongRed	Congestion Index / Congestion LOS
CongRed	Vehicle hours of delay (daily, annual)
CongRed	Speed Index (freeways and arterials)
CongRed	Travel Time Index (freeways and arterials)
CongRed	Volume to Capacity Ratio (freeways and arterials)
CongRed	Projected vehicle hours of delay (daily, annual)
CongRed	Implementation of UPWP study recommendations
CongRed	New miles of sidewalks

Category	Measures
CongRed	New miles of bicycle facilities (lanes, five-foot shoulders, paths)
CongRed	New miles of sidewalks
CongRed	New miles of bicycle facilities (lanes, five-foot shoulders, paths)
CongRed	Vehicle peak load points by line
CongRed	Vehicle loads by Key Bus Routes
CongRed	Volume to Capacity Ratio
CongRed	Fixed Route Rate of Occupancy
CongRed	Average Level of Congestion in Hours
CongRed	Congested Travel Time – Vehicle Hours of Delay (VHD): The difference expressed in hours between total optimal travel time for all vehicles and actual modeled travel time for all vehicles
CongRed	Percentage of Vehicle Miles Traveled In Congestion
CongRed	Total Lane Miles With 3+ Hours of Congestion
CongRed	Regionally significant congested corridors with a travel time index of 2.5 times or less than free flow
CongRed	Build or expand alternate bypass state highway facilities to LOS C- (through traffic D on at grade and grade separated interchanges) to reduce congestion on existing heavily congested corridors.
CongRed	To reduce travel time on existing heavily congested corridors by 25%
CongRed	As identified in the U.S. 50W PEL Study - build grade separated interchanges and add
CongRed	Average Speed During Congested Times For All Roadways
CongRed	Average Speed During Congested Times For Arterials
CongRed	Average Speed During Congested Times For Freeways
CongRed	Average Speed During Congested Times For Other Roadways
CongRed	Average Daily Traffic (ADT) per lane
CongRed	Congestion Index (CI)
CongRed	Level of Service (LOS)
CongRed	Increases in average speed
CongRed	Reduction in delay (duration, extent, severity) for various indicators (trips, vehicles, mile, etc.)
CongRed	Reduction in congested vehicle miles of travel (VMT)

Category	Measures
CongRed	Reduction in congested vehicle hours of travel (VHT)
CongRed	Increases in congested speeds
CongRed	Increases in person throughput per hour
CongRed	Increases in vehicle occupancy
CongRed	Single occupant vehicle trips eliminated
CongRed	Number of miles of congested NHS roads -- miles >80% volume-to-capacity (VOC)
CongRed	Percentage of the transportation system under congested conditions based on vehicle miles traveled (VMT) - Daily
CongRed	Percentage of the transportation system under congested conditions based on vehicle miles traveled (VMT) - Peak Period
CongRed	Average Incident Duration On Throughway System
CongRed	Average Travel Time For Motor Vehicles between Key Origin-Destinations during Mid-day
CongRed	Average Travel Time For Motor Vehicles between Key Origin-Destinations during PM Peak
CongRed	Congestion By Location of Arterials That Exceed Level of Service Thresholds in Mid-day
CongRed	Congestion By Location of Arterials That Exceed Level of Service Thresholds in PM Peak
CongRed	Congestion By Location of Freight Networks That Exceed Level of Service Thresholds in Mid-day
CongRed	Congestion By Location of Freight Networks That Exceed Level of Service Thresholds in PM Peak
CongRed	Congestion By Location of Throughways That Exceed Level of Service Thresholds in Mid-day
CongRed	Congestion By Location of Throughways That Exceed Level of Service Thresholds in PM Peak
CongRed	Travel Time Reliability On Throughways
CongRed	Vehicle Hours Traveled
CongRed	Vehicle Hours Traveled Per Capita
CongRed	Vehicle Miles Traveled Per Day
CongRed	Level of Service (LOS)
CongRed	Single Occupancy Vehicles (SOV)
CongRed	Average Commute Trip Time, Auto and Transit
CongRed	Travel time
CongRed	Travel delay from traffic congestion

Category	Measures
CongRed	Miles traveled by car
CongRed	Average Commute Time Auto Commutes of 20-Minutes or Less from Areas w/High Concentrations of Disadvantaged Populations during Peak
CongRed	Average Commute Time Auto Commutes of 20-Minutes or Less to Activity Centers during Peak Hours
CongRed	Average Travel Time From Freight Centers to Freeways
CongRed	Vehicle Miles Traveled Per Day
CongRed	Annual Hours of Delay per Peak Period Traveler
CongRed	Annual Gallons of Fuel Lost Due to Congestion per Peak Period Traveler
CongRed	Maximum throughput travel time index (max speed/speed)
CongRed	VMT is reduced (VMT, VMT per capita, average trip length)
CongRed	Vehicle Annual Hours of Delay (freeway, freight)
CongRed	Measure the transportation "level of service" available to special needs populations geographically. In lieu of having level of service standards in the short term use fixed route & ADA paratransit service combined. Longer term define level of service with the Special Needs Transportation Committee and in association with MAP-21 provisions for Section 5310.
SysRel	Roadway Reliability Index
SysRel	Percent Transit On-Time
SysRel	Percent operated scheduled trips
SysRel	Number of incidents responded by freeway patrol
SysRel	Vehicle Maintenance - mean miles between failures
SysRel	Bridges
SysRel	Subway Elevators/Escalators
SysRel	Station Accessibility
SysRel	Track Performance
SysRel	Signal Performance
SysRel	Transportation System Reliability
SysRel	Transportation System Vulnerability Index

Category	Measures
SysRel	Accessibility Index
SysRel	Travel times and reliability on major routes
SysRel	Cost and impact of traffic congestion
SysRel	Average time to clear traffic incident
SysRel	Traffic impact closures on major interstate routes
SysRel	Work zone impacts to the traveling public
SysRel	Effectiveness of improving air quality
SysRel	Time to meet winter storm event performance objectives
SysRel	Bike/pedestrian and ADA Transition Plan improvements
SysRel	Use and connectivity of modes of transportation
SysRel	Travel speeds: Average travel speed (MPH) on highways
SysRel	Congestion: Percent of urban roadways congested
SysRel	Travel time: Annual hours of delay per auto commuter
SysRel	Performance of the Interstate
SysRel	Performance of the non-Interstate NHS
SysRel	TCAT: Total revenue service hours
SysRel	TCAT: Avg transit boardings per hour
SysRel	TCAT: annual number of bicycles on buses
SysRel	Number of ‘obligated’ transportation improvement program (TIP) projects with bicycle and/or pedestrian elements
SysRel	Miles of multi-use trails
SysRel	Miles of on-road bicycle travel dedicated facilities
SysRel	% of population living within 1/2 mile of transit
SysRel	% of work trips using non-drive alone modes (transit, bicycling, walking, rideshare, etc.)
SysRel	Miles of "complete streets" (bus, bike and pedestrian facilities)
SysRel	Travel time delay

Category	Measures
Freight&EconVital	Number of jobs created/retained
Freight&EconVital	Percent of administrative (and engineering) costs spent on projects
Freight&EconVital	Large Truck VMT
Freight&EconVital	Percent/Amount of US trade through state (by mode)
Freight&EconVital	Benefit/Cost Ratio
Freight&EconVital	Distribution of RTP Expenditures Per Capita in Low-Income Communities
Freight&EconVital	Distribution of RTP Expenditures Per Capita in Minority Communities
Freight&EconVital	Distribution of RTP Expenditures Per Capita in Non Low-Income Communities
Freight&EconVital	Distribution of RTP Expenditures Per Capita in Non-Minority Communities
Freight&EconVital	Job Impacts Average Number per Year
Freight&EconVital	Output Impacts Average Gross Regional Product per Year
Freight&EconVital	Payroll Impacts Amount per Year
Freight&EconVital	Percentage of Transportation Investments Toward Maintenance and Rehabilitation
Freight&EconVital	Percentage of Transportation Investments Toward Operational Improvements
Freight&EconVital	User Costs Out-of-Pocket per Trip
Freight&EconVital	Job Creation: Number of direct and indirect jobs
Freight&EconVital	Job Creation: Direct, Indirect and Induced Employment from Transportation
Freight&EconVital	Capital Expenditure/Travel Time Savings Benefit Ratio
Freight&EconVital	Dollar Amount of Private Sector Funding As a Proportion of Total Cost of Plan
Freight&EconVital	Dollar Amount of State and Federal Funding
Freight&EconVital	Number of Private Sector Funded Projects
Freight&EconVital	O&M Expenditure/Travel Time Savings Benefit Ratio
Freight&EconVital	Percent of State and Federal Funding Sources
Freight&EconVital	Annual Cost of Congestion User Costs in Billions of Dollars
Freight&EconVital	Cost of Delay Per Capita Dollars, Per Day
Freight&EconVital	Economic Activity Generated As a Result of Transportation Investment

Category	Measures
Freight&EconVital	Financial Feasibility
Freight&EconVital	Job/House Ratio
Freight&EconVital	Jobs Created As a Result of Transportation Investment
Freight&EconVital	Total congestion cost per person
Freight&EconVital	Number of reliable trips in PM peak period
Freight&EconVital	Peak period highway VMT
Freight&EconVital	Peak period highway speed (mph):
Freight&EconVital	Peak Period truck delay (hours)
Freight&EconVital	Project cost/Vehicle miles of travel (VMT)
Freight&EconVital	reductions in VMT
Freight&EconVital	work trip Vehicle hours of travel (VHT)
Freight&EconVital	Sustained or increased funding status
Freight&EconVital	increased Sustainable development incorporating mixed-use, pedestrian-oriented design
Freight&EconVital	Evaluate number of jobs in freight intensive industries and conduct travel time studies to evaluate wait times at-grade crossings
Freight&EconVital	Evaluate net number of jobs gained near transportation improvements
Freight&EconVital	Average weekday truck hours of delay
Freight&EconVital	Number of weight-restricted or closed bridges
Freight&EconVital	Share of bridges with sufficient clearance for doublestack trains (20'x8")
Freight&EconVital	Number of projects that improve intermodal facilities and/or truck rest stops
Freight&EconVital	Regional median income
Freight&EconVital	Jobs added
Freight&EconVital	Educational attainment
Freight&EconVital	Net loss of 25-34 year old population group
Freight&EconVital	Targeted development areas
Freight&EconVital	Areas of concentrated development
Freight&EconVital	Number of jobs attracted or retained in targeted industries

Category	Measures
Freight&EconVital	Number of projects and miles of facilities constructed
Freight&EconVital	Number of miles of all season routes by county
Freight&EconVital	Connections to major users of the all season system
Freight&EconVital	Number and Percent of miles of all the season system in good or fair condition
Freight&EconVital	Pavement condition ratings, such as the Ride Quality Index or PASER rating
Freight&EconVital	accessibility analysis to intermediate facilities
Freight&EconVital	rail crossing delay
Freight&EconVital	train/vehicle or train/pedestrian crashes
Freight&EconVital	MDOT park and ride lot usage
Freight&EconVital	intermodal transfers at ground transportation centers
Freight&EconVital	use of CATA bike lockers and onboard bus bicycle racks
Freight&EconVital	freight model
Freight&EconVital	Cost Effectiveness
Freight&EconVital	Economic return from transportation investment
Freight&EconVital	National ranking of transportation infrastructure
Freight&EconVital	MoDOT national ranking in revenue per mile
Freight&EconVital	Goods movement competitiveness
Freight&EconVital	Freight tonnage by mode
Freight&EconVital	Annual hours of truck delay
Freight&EconVital	Truck reliability index
Freight&EconVital	Jobs created by projects funded through the economic development program
Freight&EconVital	Percent of minorities and females employed
Freight&EconVital	Percent of disadvantaged business enterprise participation on construction and engineering projects
Freight&EconVital	Expenditures made to certified minority, women and disadvantaged business enterprises
Freight&EconVital	Freight movement: Tonnage of goods moved
Freight&EconVital	Activity centers: Number of annual TIP projects within activity centers

Category	Measures
Freight&EconVital	Transportation costs: Annual cost of congestion per commuter
Freight&EconVital	Freight Volume By Mode
Freight&EconVital	Average Household Cost of Combined Housing and Transportation
Freight&EconVital	Travel time delay
Freight&EconVital	Annual Congestion Costs, Truck and Auto
Freight&EconVital	Freight movement time and congestion
Freight&EconVital	Economic revitalization and growth through infill/ redevelopment
Freight&EconVital	Cost of living: both Housing+transportation expenses
Freight&EconVital	% of Freight Transported by Rail or Barge
Freight&EconVital	Truck & Rail Mode Share, by value
Freight&EconVital	Truck & Rail Mode Share, by tons
Freight&EconVital	Projects included in the Washington State Freight Mobility Plan are completed
Freight&EconVital	Project Tracking (grade crossings)
Freight&EconVital	Freight access improved to MICs
Freight&EconVital	Amount of employment (measured in jobs?) within 1/4 mile of transit service (or access points to transit, such as a bus stop, rail station, etc.)
Freight&EconVital	Projects connecting low opportunity areas with high opportunity areas
EnviSust	Fuel Consumption per registered vehicle
EnviSust	Alternative fuel vehicles in state DOT fleet
EnviSust	Number of tons of recycled material used in Roadway Projects
EnviSust	Average time to complete Environmental Assessments and EIS
EnviSust	Percent of projects with updated ECR/RTL / in compliance
EnviSust	Acres of wetlands / ratio of mitigated : filled
EnviSust	Air quality index
EnviSust	Percentage Change NOx/PM by air basin
EnviSust	Percentage Change in Households within ¼ mile of Roadway Volumes Greater than 100,000

Category	Measures
EnviSust	Emissions Smog-Forming Pollutants for All Vehicle Types
EnviSust	Criteria Pollutants per Capita: Total pollutants from all vehicle (passenger and freight) types
EnviSust	GHG Emissions per Capita: Total CO2 (GHG precursor) from passenger vehicles and light duty autos only. Targeted reduction of 5% by 2020 and 10% by 2035 below 2005 levels.
EnviSust	Surface Coverage Of Transportation System on Acres of Wetlands
EnviSust	Gallons of Fuel Use Per Capita, Per Day
EnviSust	Percentage Increase in Fuel Use From a Specified Baseline
EnviSust	Impacts to natural environment (such as rate of development of green space compared to the rate of green space preservation)
EnviSust	Impacts to historic and cultural resources (such as the strengthening of regulations to protect historic and cultural resources)
EnviSust	Strengthening of regulations promoting infill and brownfield development
EnviSust	Project utilization of green infrastructure
EnviSust	Vehicle miles of travel
EnviSust	Energy consumption trends
EnviSust	Air quality trends
EnviSust	Evaluate land development outside of urban service areas
EnviSust	MetroGreen® network: Completed Metro Green® network miles
EnviSust	Vehicle Miles Traveled per capita
EnviSust	Tons of system-wide carbon dioxide emitted
EnviSust	% of population growth located in the ITCTC urbanized area and villages
EnviSust	Number of personal vehicles per household / number of households
EnviSust	Percentage of commuters driving alone
EnviSust	Energy use by transportation and by buildings
EnviSust	Natural resource land impacts
EnviSust	Emissions CO
EnviSust	Emissions CO2 Carbon dioxide: Pounds (millions) per auto commuter (CO2 produced during congestion only)
EnviSust	Emissions HC
EnviSust	Emissions NOx

Category	Measures
EnviSust	Emissions Ozone
EnviSust	Emissions PM 10
EnviSust	Emissions PM 2.5
EnviSust	Emissions VOC
EnviSust	Environmental Impacts Natural and Urban Resources (49 Categories)
EnviSust	Summarize annual monitoring reports from PSCAA and Ecology (CO, PM10, PM2.5, NOX, O3)
EnviSust	Summarize PSCAA emissions inventory by sector, show percentage of transportation sector emissions
EnviSust	Narrative that qualitatively describes status of 4-part strategy assumptions
EnviSust	Summarize Washington Department of Ecology emissions inventory, show percentage of transportation sector emissions, discuss trends in absolute emissions as well as emissions per capita
EnviSust	Summarize energy consumption by source, highlighting clean and renewable sources, as reported by WA Department of Commerce
EnviSust	Summarize energy usage by sector, total and per capita, as reported by WA department of Commerce
EnviSust	Project/investment tracking (by retrofits, natural water system restored, investments in new treatments, fish & wildlife passage maintained or restored.)
EnviSust	Water quality is improved (see VISION Monitoring), water quality indices
RedProjDelivDelays	Percent planned ROW delivered / percent parcels secured
RedProjDelivDelays	Percent of projects completed on time/on schedule
RedProjDelivDelays	Percent of projects completed on budget / cost as percent of budget
RedProjDelivDelays	Percent of project bids within estimate
RedProjDelivDelays	Value / number of projects awarded for construction
RedProjDelivDelays	Fixed-route revenue hours per capita within service areas
RedProjDelivDelays	Average number of years between first inclusion in the TIP and funds obligated for the final phase of the project – usually construction and construction inspection – for previous 5 year period

*) InfrCond: Infrastructure condition; CongRed: Congestion reduction; SysRel: System reliability; Freight&EconVital: Freight movement and economic vitality; EnviSust: Environmental sustainability; RedProjDelivDealys: Reduced project delivery delays.

Table 19. Database of 40 MPOs performance measures

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
AL	Birmingham MPO	Goal 1: Transportation System Sustainability Manage, maintain, and enhance the transportation system to ensure efficient, safe, convenient, and economical movement of people and goods	Establishing a financial management system to guide the MPO's federal funding investments.	Benefit/Cost Analysis of Scenario
			Encouraging local governments to provide additional funding for projects.	% Local Funding vs. Total Project Funding
			Supporting continuous transportation infrastructure preservation activities, including those that pursue permanent solutions and improve both facility and service operations.	% of O&M Funding vs. Total Funding
			Improving the ability to monitor the region's roadways and public transit system for greater security.	Miles of Interstate Monitored by Camera Miles of Arterials Monitored by Cameras Miles of Interstates Patrolled by ASAP ASAP Service Hour Total % of Transit Fleet with On-Board Cameras % of Transit Stops Monitored by Cameras
			Pursuing congesting mitigation strategies according to severity.	Duration of Congestion Peak Hour Congested Travel Times Person Delay
			Maintaining and improving the existing levels of service for all modes of travel by using operational strategies to optimize system efficiencies.	Composite Modal Level of Service Average Level of Service by Facility Type
			Pursuing transportation infrastructure improvements according to documented safety concerns	% Bridges Rated as Deficient % Miles of Deficient Pavement by Roadway Type
			Developing alternative travel modes and redundant ways to access areas.	Transportation System Reliability Transportation System Vulnerability Index Accessibility Index
		Goal 2: Transportation System Integration and Connectivity	Developing an interconnected network of roadways, sidewalks and transit services that connect with other transportation	Composite Connectivity Index Activity Center Connectivity Index

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
		Develop and maintain a regional transportation system that integrates land use and transportation, improving the traveler's ability to move around the region and provide access to services and opportunities.	facilities, important land uses, and activity centers.	
			Improving access to intermodal freight facilities, the Birmingham airports and in-land ports.	Transportation System Reliability Accessibility Index
			Building additional roadways to provide increased access and cross-regional mobility.	Miles of New Roadway
			Developing public transit services that serve more of the region.	Fixed Route Transit Service Area (Sq/Miles) % Population within ¼ mile of Fixed Route Service % Disabled Population within Transit Service Area Total Revenue Hours of Service
			Developing public transit services that provide a variety of different service types.	Transit Mode Availability Transit Service Diversity by Service Type
			Supporting programs that encourage travelers to use alternative commuting programs and strategies such as those offered by CommuteSmart.	Total New Carpools/Vanpools Total Annual Transit Ridership Increase Total New Daily Transit Riders by Service Type
			Developing a network of bike paths and trails to establish a regional system	Miles of New Bike Lanes Miles of New Paths
		Goal 3: Community Driven Transportation Planning Process Develop an open and transparent transportation planning process that is based on involving the community in the transportation decision-making process, and is built upon locally	Giving preference to transportation infrastructure projects that originate from and/or are identified either specifically or in concept within locally developed and adopted planning documents.	RTP Projects Identified/Listed in Adopted Local Plans
			Improving the consideration and inclusion of low-income, minority, elderly, disable and traditionally underserved (Environmental Justice) populations in the planning and decision-making process.	Opportunity Index i.e. jobs, services, education, located within ¼ mile of transit Transportation Vulnerability Index
			Giving preference to projects that avoid and/or minimize negative environmental	Total Expected Environmental Document Types

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
		developed and adopted plans.	impacts, historical and cultural impacts, and are sensitive to the local character.	
			Encouraging state and local transportation agencies and local elected officials to provide written support for transportation infrastructure projects.	Local Support Documentation
			Giving higher consideration to transportation infrastructure projects that are identified in locally endorsed regional or agency developed plan documents.	RTP Projects Identified/Listed in Agency or Functional Plans
			Eliminating and/or minimizing physical barriers, such as rail crossings, for motorized and non-motorized travel.	Total Barriers Eliminated
AL	Huntsville Area Transportation Study			**<u>Congestion Based</u>** Volume to Capacity Ratio Fixed Route Rate of Occupancy
				<u>System Efficiency</u> Average/% Vehicle Miles of Travel Average/% Vehicle Miles of Travel per Person Duration of Congestion #/% of Vehicle Miles Traveled Congested #/% of Vehicle Hours Traveled Congested Trips by Travel Mode Person Miles Traveled Total Person Hours Traveled by mode
				<u>System Mobility</u> Transit Passengers Served Transit Revenue Miles Average Daily Ridership on Fixed Routes System Wide Average Ridership Travel Speed on CMP Network Classifications Travel Times Along Corridors

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				System Accessibility % of Population within “X” Minutes of Selected Areas % of Population within “X” Miles of Transit Mean Travel Time to Work Transit Accessibility per Population Density and Level of Income
				Average Delay due to Accidents and Incidents
				Locations Experiencing Typical Delay due to Traffic Accidents
AZ	Flagstaff MPO		Traffic Control and Congestion	Annual hours of delay per capita (delay)
				Vehicle miles traveled per capita (VMT)
				Carbon Intensity: measures the amount of carbon dioxide (CO2) emitted
			Bicycle Facilities	Bicycle mode share (bicycle trips divided by total trips)
				# of network gaps
				Bicycle-motor vehicle crashes
				Miles of roadways with bike lanes/wide striped shoulders
				Bicycle Level of Service
				Bicycle facility maintenance
			Public Transportation	Annual transit ridership
				Transit mode share (transit trips divided by total trips)
				Transit productivity (ratio of ridership to transit service provided; average annual transit boardings per route mile)
				Transit accessibility (% of population and employment within 0.25 mile of bus stop/route)

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				Transit in unserved or underserved areas (transit accessibility is the inverse of this measure; consider removing)
				Transit asset condition (% of vehicles in fair, good and excellent condition)
			Pedestrian Facilities	Pedestrian mode share (pedestrian trips divided by total trips)
				# of network gaps
				Pedestrian-motor vehicle crashes
				Pedestrian level of service
				Pedestrian facility maintenance
			Access for Emergency Response	# of network gaps
				Others to potentially consider: Average response time/travel time from a station (leads to identification of potential gaps that need to be addressed)
			Transportation Planning Priorities	# of network gaps
				# of lane miles per capita
				Regional roadway miles at or over capacity
			Transportation Funding	
			Travel Patterns	Vehicle miles traveled per capita (VMT)
				Mode share (bike, pedestrian, transit, vehicle)
				Others to potentially consider: Average trip length
AZ	Maricopa Association of Governments	Travel Time, Delay, and Reliability		Mean and 80th-95th %tile and point-to-point travel times
				Congestion - spatial & temporal
				Travel time variability
		Incident management		Incident clearance time
		Mobility - Throughput (People/Freight)		Volume (Person and/or Vehicle)
				On-ramp queue size

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				Intersection LOS -based on V/C
				Lost productivity
				Signal cycle failures / Intersection queue size
				Per capita VMT
		Safety & security		Crash / injury / fatality rate
				Intersection crash ranking
		System accessibility & modal options		% of park and ride capacity used
				vehicle revenue miles of service
				% of population residing within 1/4 mile of local bus and 1/2 mile of LRT/Express bus
				Transit share of travel (by mode)
		System preservation		Bridge/Pavement condition rating
		Environmental preservation		Air quality index
		Quality of life		Customer satisfaction
				participation in MAG region trip reduction program
		Cost effectiveness		trips served/Time savings per dollar invested
CA	Kern COG	Mobility		Average Travel Time – Peak Highway Trips, Peak Transit Trips
		Accessibility/economic well being		Average Travel Time to Job Centers – Highway Trips, Transit Trips
		Reliability/congestion		Average Level of Congestion in Hours
		Reliability/safety		Annualized Accident Statistics for Annual Average Daily Traffic
		Efficiency/cost effectiveness		Average Daily Investment per Passenger Mile Traveled – Highways, Transit
		Livability/customer satisfaction		Average Trip Delay Time in Hours
		Environment/health		% Change NOx/PM by air basin
		Environment/health		% Change in Households within ¼ mile of Roadway Volumes Greater than 100,000

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
		Sustainability/preservation		% Change in Maintenance Dollars Per Lane Mile
		Equity		% of Expenditures versus Passenger Miles Traveled in 2035 – Highways, Transit
		Land Consumption		% of Farmland outside City Spheres of Influence
CA	San Diego Association of Governments		BICYCLE/PEDESTRIAN	Total Bicycle and Walking Trips
			ECONOMIC	Benefit/Cost Ratio
				Distribution of RTP Expenditures Per Capita in Low-Income Communities
				Distribution of RTP Expenditures Per Capita in Minority Communities
				Distribution of RTP Expenditures Per Capita in Non Low-Income Communities
				Distribution of RTP Expenditures Per Capita in Non-Minority Communities
				Job Impacts Average # per Year
				Output Impacts Average Gross Regional Product per Year
				Payroll Impacts Amount per Year
				% of Transportation Investments Toward Maintenance and Rehabilitation
				% of Transportation Investments Toward Operational Improvements
				User Costs Out-of-Pocket per Trip
			ENVIRONMENTAL	Emissions CO2
				Emissions Smog-Forming Pollutants for All Vehicle Types
			LAND USE	% of Households Of Low-Income Population within 0.5-Mile of a Transit Stop
				% of Households Of Minority Population within 0.5-Mile of a Transit Stop

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				% of Households Of Non Low-Income Population within 0.5-Mile of a Transit Stop
				% of Households Of Non-Minority Population within 0.5-Mile of a Transit Stop
				% of Non Work-Related Trips Accessible within 15-Minutes by Mode
				% of Work and Higher Education Trips Accessible within 30-Minutes in Peak Periods by Mode
				% of Work Trips Accessible to Low-Income Communities within 30-Minutes during Peak Periods by Mode
				% of Work Trips Accessible to Minority Communities within 30-Minutes during Peak Periods by Mode
				% of Work Trips Accessible to Non Low-Income Communities within 30-Minutes during Peak Periods by Mode
				% of Work Trips Accessible to Non-Minority Communities within 30-Minutes during Peak Periods by Mode
			MULTIMODAL	Minutes of Delay Per Capita, Per Day
				Work Trip Share During Peak Periods by Mode
			ROADWAY	Average Travel Speed To Work by Mode
				Hours of Delay Total Daily Truck Hours
				% of Vehicle Miles Traveled By Car in Congestion During Peak Periods
				% of Vehicle Miles Traveled By Car in Congestion Entire Day
				% of Vehicle Miles Traveled By Transit in Congestion During Peak Periods
				% of Vehicle Miles Traveled By Transit in Congestion Entire Day

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				% of Vehicle Miles Traveled In Congestion
				Vehicle Miles Traveled Per Capita
			TRANSIT	% of Daily Trips Within 0.5-Mile of Transit Stop
				% of Peak Period Trips Within 0.5-Mile of Transit Stop
				Total Transit Passenger Miles Per Capita
CA	San Joaquin COG	Travel Related Indicators		Vehicle Miles Traveled (VMT) per Capita: Vehicle miles traveled per person/total 2040 population
				Trip Mode Share: % of trips by mode of travel (e.g., single occupant auto, bike, walk, transit, carpool 2+)
				Congested Travel Time – Vehicle Hours of Delay (VHD): The difference expressed in hours between total optimal travel time for all vehicles and actual modeled travel time for all vehicles
				Average Trip Length: Total Vehicle Miles Traveled / # of Trips for all Purposes
				Total Miles of Bikeways by Class: Miles of Class I, II, and III facilities
				Transit Ridership: # of passenger trips
				Bike and Walk Trips (Active Transportation): # of bike and walk trips
		Health & Environmental Indicators		Criteria Pollutants per Capita: Total pollutants from all vehicle (passenger and freight) types
				GHG Emissions per Capita: Total CO2 (GHG precursor) from passenger vehicles and light duty autos only. Targeted reduction of 5% by 2020 and 10% by 2035 below 2005 levels.
		Resource Conservation Indicators		Acres of Land Consumed: Total acres of land consumed due to new development

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				Acres of Prime Farmland Consumed: Total acres of prime farmland consumed due to new development
		Efficiency		Energy Usage per New Household: Total energy consumption from new growth
				Water Consumption per New Household (Internal & External): Total tons of water usage from new growth
				Land Use Mix: % of new development that is infill development, redevelopment, and Greenfield
		Housing and Employment		1. Housing and Employment near Major Transit Routes and Stations (SB375 defined High Quality Transit Areas)
				2. Housing and Employment near Quality Transit (any transit routes with 2 or more buses per hour)
				Residential Density: Change in residential density for new housing
				Housing Type: % of new housing by type (large-lot, small-lot, attached, multi-family)
		Equity (Environmental Justice Areas vs. Non-Environmental Justice Areas)		Health Risk Assessment of Roadway Pollutants: % of households within 500 feet of high-volume roadway (>100,000 average daily traffic)
				Transportation Costs: % of household income spent on transportation
		Safety		Collision Rate: Statewide Accident Rate multiplied by VMT
		Economic Vitality		Job Creation: # of direct and indirect jobs
		Land Use Mix:		% of New Growth in Transit-Oriented Development/Infill Sites (Acres)
				% of New Growth In Existing Urbanized Area (Acres)
				Acres of Prime Farmland Consumed:
				% of Total New Development

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				Energy Use per Household: (in Million BTUs/Year/Household)
				Water Consumption per Household: (in Gallons/Day/Household)
		Improve Air Quality and Reduce Greenhouse Gases:		GHG Emissions % Change From 2005
				Vehicle Miles of Travel (VMT) (daily per capita)
		Maximize Mobility and Accessibility		Average Trip Length
				Congested Travel Time (Vehicle Hours of Delay in Millions)
				Transit Ridership (Boardings)
				Bike and Walk Trips
				Average Travel Time (in minutes)
		Increase Safety and Security		Accident Rate: Per 100,000 VMT
		Preserve the Efficiency of the Existing Transportation System		Housing and Employment near Major Transit Routes and Stations: All Bus Transit (2+ Buses per Hour): Housing
				Housing and Employment near Major Transit Routes and Stations: All Bus Transit (2+ Buses per Hour): Employment
				Housing and Employment near Major Transit Routes and Stations: High-Quality Transit Areas (Routes, Hubs and Stations): Housing
				Housing and Employment near Major Transit Routes and Stations: High-Quality Transit Areas (Routes, Hubs and Stations): Employment
				Total Land Consumed for New Development
		Support Economic Vitality		Job Creation: Direct, Indirect and Induced Employment from Transportation
		Improve Public Health and Build on Active Transportation		Residential Density (Units/Net Acre) for New Growth
				Total Miles of New Bikeways (in Lane Miles)

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				Trip Mode Share: Drive Alone
				Trip Mode Share: Shared Ride 2
				Trip Mode Share: Shared Ride 3
				Trip Mode Share: Transit (Walk + Drive)
				Trip Mode Share: Walk
				Trip Mode Share: Bike
				Criteria Pollutants per Capita (in Tons Daily)
CO	Denver Regional COG		LAND USE	% of Population In Low-Income or Minority Areas with Good Transit-Job Accessibility
				% of Population With Good Transit-Job Accessibility
			MULTIMODAL	Hours of Delay
				Total Person Trips
			ROADWAY	Average Roadway Speed
				Average Roadway Speed Peak-Period
				% of Vehicle Miles Traveled In Congestion
				Person Hours Traveled Not Including Transit
				Person Miles Traveled Not Including Transit
				Total Lane Miles With 3+ Hours of Congestion
				Total Vehicle Trips
				Vehicle Hours Traveled
				Vehicle Miles Traveled
				Vehicle Miles Traveled Per Capita
			TRANSIT	Annual Rail Transit Trips
				Annual Transit Trips
				Person Miles Traveled On Transit
				Transit Share of Daily Trips All Trips
				Transit Share of Daily Trips Work Trips
CO			Conforms to air quality requirement	Air quality conformity tests on plans and programs

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
	North Front Range MPO	ECONOMIC DEVELOPMENT/QUALITY OF LIFE: Foster a transportation system that supports economic development and improves residents' quality of life proposed	Maintain transportation infrastructure and facilities to minimize the need for replacement or rehabilitation	# of facility samples with poor surface condition
			Investment in infrastructure	# of facility samples with poor surface condition Bridges with a sufficiency rating below 50.0 as determined through CDOT Bridge Management System
		MOBILITY: Provide a transportation system that moves people and goods safely, efficiently, and reliably	Reduce # of severe traffic crashes	Five-year rolling average of injury and fatal crashes
			Use the Congestion Management Process (CMP) to reduce congestion	Regionally significant congested corridors with a travel time index of 2.5 times or less than free flow
			Reliable travel times	Regionally significant congested corridors with a travel time index of 2.5 times or less than free flow Transit on-time arrival per schedule
		MULTI_MODAL: Provide a multi-modal system that improves accessibility and transportation system continuity	Support transportation services for all including the most vulnerable and transit dependent populations	Population and essential destinations within a ¼ mile of fixed routes in transit communities Population and essential destinations within para-transit and demand response service area within the MPO boundary
			Implement RTE, Regional Bicycle Plan, and North I-25 EIS	Revenue hours per capita for the entire MPO
			Develop infrastructure that supports alternate modes and connectivity	Regionally significant congested corridors with a travel time index of 2.5 times or less than free flow Non-motorized facilities per capita
		OPEARTION: Optimize operations of transportation facilities	Use transportation demand management techniques to reduce congestion and optimize the system	Transit on-time arrival per schedule Transit use of facilities and services
			Implement intelligent Transportation Systems (ITS)	Transit service vehicles within useful life parameters established by FTA1
			Enhance transit service in the NFR	Rate of VMT growth per capita
			Reduce project delivery time frame	Fixed-route revenue hours per capita within service areas

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
CO	Pueblo Area COG MPO and TPR	Goal: Improve safety by providing a multi-modal transportation system that focuses on the reduction of the frequency and severity of crashes.		Reduce the fatal crash rate by 50%
				Decrease the “serious” injury crash rate by 25%
				Decrease the injury crash rate by 25%
				Decrease the PDO rate of crashes by 25%
				Decrease the frequency and severity of public transit related crashes by 10%
				Decrease the frequency and severity of pedestrian related accidents by 75%
				Eliminate railroad crossing related crashes by 75%
				Enhance the overall safety of the transportation system by implementing engineering, education, and enforcement strategies to reduce traffic-related injuries and fatalities.
		Goal: Improve and sustain the surface conditions of the State highway system.		Achieve 80% High/Moderate Drivability Life for the Interstate Highway System based on condition standards and treatments set for traffic volume categories.
				High/Moderate Drivability Life for the National Highway System based on condition standards and treatments set for traffic volume categories.
				Achieve 80% High/Moderate Drivability Life for the State Highway System based on Condition standards and treatments set for traffic volume categories.
		Goal: Maintain Bridges		In priority, (1) Interstate, (2) NHS and U.S. State highways, and (3) all other State highways: - Improve the SR rating of interstate, NHS, and U.S. State highway bridges to a range of 75 to 100 - Improve the SD rating of all other State highway
		Goal: Bring all interstate, NHS, U.S. and other state highways up to current AASHTO standards that improve the flow of motor vehicles and transit.		Upgrade all functionally obsolete interchanges, accel/decel lanes, inadequate ramp lengths, inadequate shoulders, etc.

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				Interstate, NHS, U.S. highways and other state highways: LOS C- (through traffic LOS D at grade and grade separated/interchanges)
		Goal: Relieve existing heavy congestion on U.S. highways, NHS highways by implementing alternative transportation corridors (i.e. Bypass facilities.)		Build or expand alternate bypass state highway facilities to LOS C- (through traffic D on at grade and grade separated interchanges) to reduce congestion on existing heavily congested corridors.
				To reduce travel time on existing heavily congested corridors by 25%
				As identified in the U.S. 50W PEL Study - build grade separated interchanges and add
		Goal: Provide a safe and efficient interstate and NHS, and other State highway system for the movement of freight.		Reduce the # and severity of truck/freight related crashes by 75% on the New Pueblo Freeway (NAFTA corridor – designated national freight movement corridor) interstate system
				Reduce the # and severity of truck/freight related crashes by 75% on U.S. highways and other NHS highways
				Improve all functionally obsolete interchanges, accel/decel lanes, inadequate ramp lengths, inadequate shoulders to AASHTO standards for the safe and efficient movements of freight through Pueblo County's interstate system
				Sustain and improve a regional roadway system that provides local, regional and statewide efficient access and connectivity for the movement of freight and people
		Goal: Encourage corridor preservation and expansion efforts for both passenger and freight rail, and railroads.		
		Goal: Provide transportation facilities that optimize system performance and safety, and preserves and enhances the present and future mobility needs of the Pueblo Region		Reduce minutes of delay on congested corridor segments on interstate, NHS and other state highways by: - Maintain and expand the Pueblo region's transit system - Reduce traffic congestion

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				by implementing TSM measures to improve passenger carrying capacity of the regional transportation network - Increase capacity on congested segments (add additional lanes) on 1) Interstate; 2) NHS; 3) Other State highways - Increase intersection capacity through the addition of turn lanes, queuing storage lengths, signal improvements, and grade separated interchanges as identified in the US-50 PEL and at failing intersections
				Reduce the projected SOV trips between 2015 – 2040 by 5% through implementing strategically located park and ride facilities and encouraging the increased use of transit and car pooling
				Deploy intelligent Transportation Systems
		Goal: Reduced fossil fuel consumption and reduce greenhouse gas and other emissions.		Have a 50% reduction from 2005 levels of annual metric tons per capita between 2015 and 2040.
		Goal: Improve and support a transportation system improvements that address needs for citizens with disabilities, low incomes, and other special needs residents in the region.		Incorporate social, economic, and environmental concerns into the planning, design, construction, maintenance, and operation of the Pueblo regional multimodal transportation system.
				Identify the pros and cons of environmental justice issues of projects. - Have participation from identified (low income, minority populations, etc.) that documents benefits and burdens of projects.
		Goal: Reduce transportation-related adverse impacts to communities, neighborhoods, natural environments, and areas identified for cultural		
		Goal: Accelerate the timeframe for the completion of projects.		Improve timing to streamline approval processes, including reviews, contracts, and general clearances
				When possible do not require design and construction funding and having separate consultants for design/construction to be split up

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				Utilize Design/Build and Every Day Counts concepts to identify and deploy innovation aimed at shortening project delivery, enhancing the safety, and protecting the environment. These concepts include: - Shortened project delivery - Flexibilities and coordination in Right of Way - Accommodation and relocation of utilities
		Goal: Increase the Bicycling and Walking activity in Pueblo County for people all ages.		● Improve multi-modal corridor bicycling and pedestrian conditions
				● Create and expand permanent data collection and counting procedures to monitor usage.
				● Complete # counts a minimum of two times every five years
				● Establish a pilot program for a school in Pueblo to increase the # of students walking or bicycling to school
				● Increase the # of participants within Pueblo County in the National Bicycle Challenge and Bike to Work Events
		Goal: *Improve the quality of life through an increase in attractive multi modal facilities accessible for pedestrians and cyclist and improve connectivity.		● Provide improved bike & pedestrian friendly connections to existing multi-modal facilities and destinations.
				● Measure progress by counting facilities being built and compare
			BICYCLE/PEDESTRIAN	% increase in the #/mileage of non-motorized facilities
FL	Miami-Dade MPO		ECONOMIC	Capital Expenditure/Travel Time Savings Benefit Ratio Dollar Amount of Private Sector Funding As a Proportion of Total Cost of Plan Dollar Amount of State and Federal Funding # of Private Sector Funded Projects O&M Expenditure/Travel Time Savings Benefit

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				Ratio
				% of State and Federal Funding Sources
				PTP Expenditure/Travel Time Savings Benefit Ratio
			ENVIRONMENTAL	Emissions CO
				Emissions NOx
				Emissions VOC
				Surface Coverage Of Transportation System on Acres of Wetlands
			LAND USE	Highway Lane and Centerline Miles Within 1-Mile of Major Healthcare, Recreation, Education, Employment, and Cultural Facilities
				Highway Lane Miles Within 1-mile of Major Activity Centers
				Highway Lane Miles Within 1-Mile of Major Freight Origins and Destinations
				Highway Lane Miles Within 1-Mile of MIA, Opa Locka, HGAA, and Port of Miami
				Highway Lane Miles Within 1-mile of Redevelopment Areas
				Highway Lane Miles Within 1-mile of Tourist Attractions
				Highway Lane Miles Within Urban Infill Area
				Highway Miles In Corridors of Regional Significance
				Transit Route Miles Within 0.5-mile of Major Activity Centers
				Transit Route Miles Within 0.5-mile of Major Healthcare, Recreation, Education, Employment, and Cultural Facilities
				Transit Route Miles Within 0.5-Mile of MIA, Opa Locka, HGAA, and Port of Miami
				Transit Route Miles Within 0.5-mile of Redevelopment Areas
				Transit Route Miles Within 0.5-Mile of TAZs with a

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				High Proportion of Elderly Population
				Transit Route Miles Within 0.5-Mile of Tourist Attractions
				Transit Route Miles Within Urban Infill Area
			MULTIMODAL	Average Home-Based Work Travel Time
				Average Travel Time All Purposes
				Average Travel Time To/From TAZs with a High Proportion of Elderly Population
				Hours of Delay
				Hours of Delay On Highway Facilities with Transit Service
			ROADWAY	Highway Centerline Miles On SIS Connectors
				HOV/HOT Lane Miles
				Level of Service
				# of Improvements on Local Facilities Non-State Highway System
				Ratio of Highway Lane Miles Inside/Outside of UDB Boundaries
				Total Lane Miles Of Special Use/Managed Lanes
				Total Lane Miles Within Evacuation Travel Corridors
				Vehicle Miles Traveled
			SAFETY	Level of Investment in Safety Projects
				# of Accidents
			TRANSIT	Daily Transit Route Miles Non-Fossil Burning
				# of Daily Passengers On Public Transit
				# of Park-and-Ride/Multimodal Facilities
				# of Transit Patrons Going To/From Airports and Seaports
				Ratio of Transit Route Miles Inside/Outside of UDB Boundaries
				Service Coverage % In Transit-Supportive Areas
				Transit Route Miles From Cities and Central Areas in the AM Peak Period

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				Transit Route Miles In Corridors of Regional Significance Transit Route Miles
FL	METROPLAN Orlando	ECONOMIC		Annual Cost of Congestion User Costs in Billions of Dollars
				Cost of Delay Per Capita Dollars, Per Day
				Economic Activity Generated As a Result of Transportation Investment
				Financial Feasibility
				Job/House Ratio
				Jobs Created As a Result of Transportation Investment
		ENVIRONMENTAL		Emissions CO
				Emissions HC
				Emissions NOx
				Gallons of Fuel Use Per Capita, Per Day
				% Increase in Fuel Use From a Specified Baseline
		LAND USE		% of Employment Within 0.25-mile of Transit Service
				% of Employment Within 30-Minute Commute from International Airports
				% of Population Living within 0.25-Mile of Transit Service
				% of Population Within 10-Minute Travel Time of Activity Centers
				% of Population Within 5-Minute Commute of Intermodal Stations
		MULTIMODAL		Hours of Delay Total Daily Vehicle Hours
				Minutes of Delay Per Capita, Per Day
		ROADWAY		Average Speed During Congested Times For All Roadways

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				Average Speed During Congested Times For Arterials
				Average Speed During Congested Times For Freeways
				Average Speed During Congested Times For Other Roadways
				Average Vehicle Miles Traveled Per Dwelling
				% of Person Trips By Single-Occupancy Vehicle
				Total Lane Miles Designated for Freight, Goods, and Services Movement
				Total Lane Miles
				Total Lane Miles Of Evacuation Routes Per Thousand People
				Total Lane Miles Per Thousand People
				Total Roadway Miles Below Standard
				Vehicle Hours Traveled Per Capita
				Vehicle Miles Traveled Per Capita
		SAFETY		Crash Rate Per Million Vehicle Miles Traveled
		TRANSIT		Total Transit Passenger Miles Per Capita
				Transit Revenue Hours of Service Per Thousand People
				Transit Route Miles
				Transit Route Miles Per Thousand People
FL	Palm Beach MPO	Goal 1 Provide an efficient and reliable vehicular transportation system	Objective 1.1 Reduce the # of thoroughfare intersections with critical sum > 1400 from 40 to 30 by 2025.	
			Objective 1.2 Increase the % of traffic signals connected to the central control system by fiber optic network from 78% to 85% by 2025.	

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
			Objective 1.3 Increase the % of principal arterials covered by closed-circuit TV cameras from x to y by 2025.	
			Objective 1.4 Increase the % of traffic signals with video detection from x to y by 2025.	
		Goal 2 Prioritize an efficient and interconnected mass transit system	Objective 2.1 Increase the % of transit mode choice from 1.6% to 3% by 2025.	
			Objective 2.2 Increase passenger trips per revenue mile for Tri-Rail service from 1.36 to 1.5 and for Palm Tran fixed route service from 1.61 to 2.0 by 2025.	
			Objective 2.3 Increase the # of park-n-ride spaces from 2,196 to 3,000 by 2025.	
			Objective 2.4 Reduce the average ratio of transit time to auto time from 2.87 to 2.5 for Palm Tran fixed route system by 2025.	
		Goal 3 Prioritize a safe and convenient non-motorized transportation network	Objective 3.1 Increase the % of pedestrian mode choice from 1.7% to 3.5% and of bicycling mode choice from 0.5% to 1.5% by 2025.	
			Objective 3.2 Increase mileage of designated bike lanes from 125 to 250, of 10-ft or wider shared use pathways from 25 to 75, and of buffered bike lanes from 8 to 50 by 2025.	
			Objective 3.3 Increase mileage on the designated priority bike network operating at bike level of service C or better from 140 miles to 355 miles by 2025.	
			Objective 3.4 Increase the % of thoroughfare miles within 2 miles of transit hubs that provide dedicated bicycle	

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
			facilities from 10% to 25% and that provide dedicated pedestrian facilities from 85% to 100% by 2025.	
		Goal 4 Maximize the efficient movement of freight through the region	Objective 4.1 Decrease the mileage of SIS facilities and connectors with v/c > 1.1 from x to y by 2025	
			Objective 4.2 Decrease the mileage of designated truck routes with v/c > 1.1 from x to y by 2025	
			Objective 4.3 Increase the volume of freight through the Port of Palm Beach, Palm Beach International Airport and the rail network from x to y by 2025.	
		Goal 5 Preserve and Enhance Social and Environmental Resources	Objective 5.1 Decrease per capita total fuel use from x to y by 2025.	
			Objective 5.2 Decrease per capita daily NOx emissions from x to y by 2025.	
			Objective 5.3 Decrease per capita daily VOC emissions from x to y by 2025.	
			Objective 5.4 Decrease per capita Daily Vehicle Miles Travelled (VMT) from 25 to 21 by 2025.	
GA	Atlanta Regional Commission	Mobility		Average commute travel time by auto / transit (in minutes)
		Connections / Accessibility		Worker access to employment centers within 45 minutes by car (index)
				Worker access to employment centers within 45 minutes by transit (index)
				Average # of jobs within 45 minutes of home for typical person
		Economic Growth		Total congestion cost per person
				# of reliable trips in PM peak period

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				Peak period highway VMT
				Peak period highway speed (mph):
				Peak Period truck delay (hours)
		Safety		% of all regional crashes with an identified PLAN 2040 Update project
				% of PLAN 2040 Update projects that intersect above average crash rate facilities
GA	Coastal Region MPO	Economic Activity: Support the economic vitality of the region, matching the community's goals, especially by enabling local, regional and global competitiveness, productivity and efficiency.	- Minimize work trip congestion - Promote projects which provide the maximum travel benefit per cost	- Project cost/vehicle miles of travel (VMT) - Reductions in VMT - work trip vehicle hours of travel (VHT) - Sustained or increased funding status - increased Sustainable development incorporating mixed-use, pedestrian-oriented design
		Safety: Ensure and increase the safety of the transportation system for all users, including motorized vehicles, bicyclists and pedestrians.	- Eliminate at-grade railroad crossings - Minimize frequency and severity of vehicular accidents - Minimize conflicts and increase safety for nonmotorized users	- Total accidents per million miles traveled, involving all user types - Injury accidents per million miles traveled, involving all user types - Fatal accidents per million miles traveled, involving all user types - Implementation of transit and other safety projects - # of increased bike and pedestrian facilities - # of at-grade crossings reduced
		Security: Ensure and increase the security of the transportation system for all users, including motorized vehicles, bicyclists and pedestrians.	- Promote projects which aid in hurricane evacuation - Adequately prepare for coordinated responses to incidents - Monitor vulnerable infrastructure through visual and other inspection methods	- Hurricane evacuation route status - Improved emergency responses (e.g., ambulance travel times to hospitals) - Maximize transportation system mobility during disruptive events (such as reductions in time to clear major crashes from through lanes) - Reduction in vulnerability of the transportation

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				system (such as implementation of monitoring infrastructure for major transportation system)
		Accessibility, Mobility and Connectivity: Ensure and increase the accessibility, mobility and connectivity options available to people and freight, and ensure the integration of modes, where appropriate.	- Minimize congestion delays - Maximize regional population and employment accessibility - Provide efficient and reliable freight corridors - Minimize delays in corridors served by transit - Encourage use of transit and non-motorized modes, focusing on areas with low rates of - automobile ownership or high population of elderly and/or disabled populations - Expand transit service area and increase service frequency	- Base year vs. future year volume/capacity ratios for various modes - % of population within ½ mile of transit route or facility connecting to regional activity center(s) - Daily freight truck use/lane - Operational performance of transit system (buses arriving/departing on schedule) - % of population within ½ mile of bicycle facility connecting to regional activity center(s) - Transit ridership
		Environment and Quality of Life: Protect, enhance and sustain the environment and quality of life, promote energy conservation and address climate change.	- Protect wetlands, historic resources, neighborhoods, recreational facilities and other important resources - Support infill development - Implement green infrastructure to reduce region's impact on storm water pollution and address potential impacts from a changing climate	- Impacts to natural environment (such as rate of development of green space compared to the rate of green space preservation) - Impacts to historic and cultural resources (such as the strengthening of regulations to protect historic and cultural resources) - Strengthening of regulations promoting infill and brownfield development - Project utilization of green infrastructure - Vehicle miles of travel - Energy consumption trends - Air quality trends
		System Management and Maintenance: Assess the transportation system to determine what works well, what does not work	- Maximize efficiency of signalized intersections - Expand use of Intelligent Transportation Systems (ITS)	- Average Daily Traffic (ADT) per lane - Congestion Index (CI) - Level of Service (LOS) - ITS coverage of region - Roadway pavement ratings and bridge sufficiency

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
		well, and potential improvement options.	- Continue existing levels of maintenance for highways and bridges	ratings - Bicycle and pedestrian facility surface conditions - Transit user satisfaction (such as reliability)
		Intergovernmental Coordination: Ensure coordination in the transportation planning process between intra- and inter-regional partners, including both state and local agencies.	- Enhance coordination between CORE MPO, Georgia Department of Transportation, County departments and City governments	- CORE MPO represented at all project development meetings - Establishment of coordination policies to promote communications between various agencies
GA	Valdosta-Lowndes MPO	Develop a sustainable and safe regional transportation system that includes all modes for the transport of people and goods that promotes economic development.	Develop safe transportation corridors that efficiently connect regional activity centers, reduce travel time and vehicle miles travelled	Evaluate the level of service on roadways to and from activity centers, especially east-west routes.
			Develop a transportation system that is efficient for freight movement, while providing for the efficient movement of non-rail vehicular traffic through the region	Evaluate # of jobs in freight intensive industries and conduct travel time studies to evaluate wait times at at-grade crossings
			Enhance and develop secure, coordinated public transit, especially for the transportation disadvantaged, to serve the entire region that promotes economic development	Implementation of a coordinated public transit system in the Valdosta Urbanized Area
			Preserve transportation corridors for future multi-modal transportation system improvements that reduce bottlenecks and promote alternative modes	Work with local land use agencies to analyze future improvements to ensure they will accommodate planned multi-modal improvements
			Develop interconnected bike and pedestrian facilities and amenities through the implementation of projects and policies	# of bike and pedestrian facilities implemented and/or interconnected
			Coordinate transportation improvements with local economic development	Evaluate net # of jobs gained near transportation improvements

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
			organizations to support business and tourism growth	
		Encourage the MPO, SGRC and their member communities to cooperatively consider land use decisions by encouraging public participation and involvement in the transportation planning process.	Create opportunities for public involvement in the planning process and mitigate impacts to low-income and minority populations	Annually evaluate public involvement effectiveness through # of persons contacted and events held
			Develop public information opportunities for all ages regarding traffic safety, biking and walking safety, and the planning process	Produce documents for education and public information, including annual crash reports and intersection safety audits
			Prioritize transportation investments using objective criteria to select projects	Develop criteria for implementing transportation investments
			Promote public/private partnerships to enhance funding opportunities	Evaluate # of public/private partnerships accomplished
			Encourage cooperative land use strategies that minimize sprawl and mitigate adverse environmental impacts	Evaluate land development outside of urban service areas
			Coordinate projects and policies with adjacent communities to reduce urban sprawl and prioritize regionally significant projects	# of multi-jurisdictional or coordinated transportation improvement projects/policies
		Promote an aesthetically pleasing, sustainable, transportation system that respects the needs of, and mitigates and/or enhances the impacts on disadvantaged populations and the context of the nearby built and natural environments.	Preserve and enhance the context and aesthetics of the natural and built environments, encourage the enhancement of gateways and corridors throughout the community	Evaluate context sensitive solutions implemented in transportation projects and policies
			Support ‘green’ transportation (fuels and materials), and develop infrastructure for alternative modes of transportation	Report use of alternative fuels and infrastructure projects for alternative modes of transportation
			Improve and develop an aesthetically pleasing regional activity center way-finding and signage system for residents and visitors	Report on signs installed and public acceptance of new signage

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
IN	Indianapolis MPO	Goal 1: Preserve, make safe, and improve utilization of the existing transportation system.		% of pavement in good condition
				% of bridges in good condition
				Crash rates
		Goal 2: Enhance regional transportation mobility and accessibility.		Reduction in peak-period delay
				Volume to capacity ratio
				Intercorridor connectivity
				Intracorridor connectivity
				Potential trips served by transit service
				Importance to freight mobility
		Goal 3: Coordinate transportation system improvements to be consistent with regional values.		Changes in population and employment
				Industry cluster support
				Land use intensity
MA	Boston Region MPO	SAFETY Transportation by all modes will be safe.	OBJECTIVE Reduce the # and severity of crashes, all modes	Fatalities # of traffic fatalities Automobile fatalities Truck fatalities Bicyclist fatalities Pedestrian fatalities
				Fatality Rate Traffic fatalities per 100 million VMT Automobile fatalities (per 100 million VMT) Truck fatalities (per 100 million VMT) Bicyclist fatalities (per 100,000 residents) Pedestrian fatalities (per 100,000 residents)
				Serious Injuries (hospital stays for nonfatal injuries) # of traffic serious injuries Automobile serious injuries Truck serious injuries Bicyclist serious injuries Pedestrian serious injuries

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				Serious Injury Rate (hospital stays for nonfatal injuries) Serious injuries per 100 million VMT Automobile serious injuries (per 100 million VMT) Truck serious injuries (per 100 million VMT) Bicyclist serious injuries (per 100,000 residents) Pedestrian serious injuries (per 100,000 residents)
				HSIP Clusters for all modes (High Crash Locations based on EPDO index) # of TIP projects that have a major safety component
		SYSTEM PRESERVATION The transportation system will be well maintained.	OBJECTIVE Reduce the # of bridges that do not meet standards	Structurally deficient bridges
			OBJECTIVE Improve the condition of on- and off-system bridges	Bridge Health Index: ratio of the current condition of each element to its perfect condition
			OBJECTIVE Improve pavement condition on the MassDOT-monitored roadway system	Pavement condition: PSR ranks pavement on a fivepoint scale from very poor to excellent
			OBJECTIVE Improve transit reliability for all customers by maintaining and modernizing capital assets throughout the system	Vehicle Maintenance - mean miles between failures
				Bridges
				Subway Elevators/Escalators
				Station Accessibility
				Track Performance
				Signal Performance
		CONGESTION REDUCTION Congestion and delays	OBJECTIVE Reduce delay for all modes	Vehicle hours of delay (daily, annual) Speed Index (freeways and arterials) Travel Time Index (freeways and arterials) Volume to Capacity Ratio (freeways and arterials)

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
		will be reduced for all modes.		Projected vehicle hours of delay (daily, annual) Implementation of UPWP study recommendations
			OBJECTIVE Expand the sidewalk network in the region	New miles of sidewalks New miles of bicycle facilities (lanes, five-foot shoulders, paths)
			OBJECTIVE Expand the bicycle network in the region	New miles of sidewalks New miles of bicycle facilities (lanes, five-foot shoulders, paths)
			OBJECTIVE Reduce delay for transit customers (rapid transit lines, key bus routes, etc.)	Vehicle peak load points by line Vehicle loads by Key Bus Routes
		GHG/AIR POLLUTION GHG emissions will meet Global Warming Solutions Act requirements.	OBJECTIVE Reduce GHGs from transportation	GHG (CO2) VOCs NOx CO PM
		TRANSPORTATATION OPTIONS/MODE SHARE Transit, bicycling, and walking options will be available.	OBJECTIVE Reduce automobile usage in the Boston region OBJECTIVE Increase the share of travel by transit, bicycling, and walking in Massachusetts OBJECTIVE Increase transit usage in the Boston region	VMT per capita VMT per household Automobile ownership per household Mode share (auto, transit, bike, pedestrian) Transit ridership by line
			OBJECTIVE Expand the sidewalk network in the region OBJECTIVE Expand the bicycle network in the region OBJECTIVE Increase bike parking usage at transit stations	New miles of sidewalks New miles of bicycle facilities (lanes, five-foot shoulders, paths) # of projects with pedestrian access # of gaps closed # of bicycles parked/% of spaces utilized

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
			OBJECTIVE Increase automobile parking usage at transit stations	# of automobiles parked/% of spaces utilized
			OBJECTIVE Increase the region's land area with more than 5,000 people per square mile served by transit	Land area with more than 5,000 people per square mile served by transit
			OBJECTIVE Increase the % of population and employment within 1/4 mile of transit stations	% of population and employment within 1/4 mile of transit stations
			OBJECTIVE Increase the % of population and employment within 1/2 mile of shared-use paths or on-road bicycle facilities	% of population within 1/2 mile of shared-use paths or on-road bicycle facilities
		TRANSPORTATION EQUITY There will be an equitable level of mobility for traditionally underserved populations.	OBJECTIVE Maintain comparable access to jobs, hospitals, and schools for EJ populations compared with non-EJ populations	Average travel time to industrial, retail, and service jobs Average travel time to hospitals Average travel time to two- and four-year institutes of higher learning Average # of industrial, retail, and service jobs within a 40-minute transit and 20-minute auto trip
		ECONOMIC VITALITY/FREIGHT The transportation network will provide a strong foundation for economic vitality.	OBJECTIVE Reduce delays on the freight network OBJECTIVE Improve the efficiency of the freight network	Average weekday truck hours of delay # of weight-restricted or closed bridges Share of bridges with sufficient clearance for doublestack trains (20'x8") # of projects that improve intermodal facilities and/or truck rest stops
			OBJECTIVE Minimize the net loss of 25-34 year old	Regional median income Jobs added

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
			population group from the region OBJECTIVE Minimize the burden of housing and transportation costs for residents in the region	Educational attainment Net loss of 25-34 year old population group Targeted development areas Areas of concentrated development Average median housing plus transportation costs as a % of income
MI	Tri-County Regional Planning Commission	Small Urban		Crash rates
				Pavement condition ratings
				Levels of service
		Enhancements (Non-Motorized)		Additional miles of non-motorized facilities constructed
				Reduction in crashes involving bicycles or pedestrians
				Connections between origins and destinations for non-motorized trips
				Maintenance/surface conditions of facilities
				# of barriers eliminated
				Use by user types
				# of gaps filled or lines completed
				System connectivity, as measured by # and type of access points to the facility
		Enhancements (Aesthetic)		# of miles of aesthetic treatment implemented
				Equity of fund allocation in the region for all communities
		Enhancements (Historic Preservation)		Support for local preservation efforts
				# of structures or acres preserved
		Enhancements (Wildlife Mitigation)		# of projects completed
				Deer/car crashes
				Impacts on habitat preservation
				Impacts on wildlife population

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				Samples of inflow and outflow to determine sedimentation rates or prior similar
		Enhancements (Drainage)		Acre feet of transportation related runoff diverted from non-point source dispersion
				# of successful project applications
				Crash rate analysis
				Congested vehicle miles of travel
				Congested vehicle hours of travel
				Average Speed
				Congested speeds
				Delays: duration, extent, severity
				Delay per incident
				Average travel time per trip
				Persons per hour on the facility or in a corridor
				Level of service
				Congested lane miles
		Improve-Expand		% of vehicle miles traveled by functional classification
				VMT per lane mile
				Delay per lane mile
				Delay per VMT
				Delay per trip
				Delay rate
				Travel rate
				# and % of signal cycle failures
				Total vehicle delay
				Average and maximum queues
				Proportion of persons congested or delayed

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				Person hours of delay
				Vehicle occupancy
				Person throughput per hour
		Bridge/Critical Bridge Program		# of regional structurally deficient bridges
				# of regional functionally obsolete bridges
				# of regional bridges on state critical bridge list
		Preserve		Pavement condition ratings, such as the Ride Quality Index or PASER rating
				# and % of miles on the regional federal aid system in fair and good condition
		Transportation Economic		# of jobs attracted or retained in targeted industries
				# of projects and miles of facilities constructed
				# of miles of all season routes by county
				Connections to major users of the all season system
				# and % of miles of all the season system in good or fair condition
				Pavement condition ratings, such as the Ride Quality Index or PASER rating
		Transit Capital		Average fleet age
				Average miles/vehicle by vehicle type
		Transit Operating		Total miles
				Total hours
				Total operating costs
				Total passenger trips provided
		Enhancement (Public Transit)		# of total passenger shelters and benches
				annual average boardings per location per asset (shelters, benches, etc.)
		Intermodal (Freight)		accessibility analysis to intermediate facilities

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				rail crossing delay
				train/vehicle or train/pedestrian crashes
				MDOT park and ride lot usage
				intermodal transfers at ground transportation centers
				use of CATA bike lockers and onboard bus bicycle racks
				freight model
		Land Use, Community Development		# of projects funded
				annual % of funds allocated to implement the regional growth project land use
				impacts of the project on increasing population or housing density consistent with regional
				person throughput per hour or day
		Safety		crash reduction factors by type of crash
				crashes per million entering vehicles (intersections)
				crashes per million vehicle miles (roadways)
				annual net reduction in crashes, injuries and fatalities per capita of regional, county or
				reduction in crashes involving bicycles or pedestrians
				air cargo tonnage
		Parking		parking occupancy rates
				parking turnover rates
				spaces per employee ratios within 1/4 mile
				spaces per retail floor area ratio within 1/4 mile
		Management and Operations		person throughput per hour or day
				% of funds allocated to management and operations on an annual basis
				crash rate analysis

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				congested vehicle miles of travel
				congested vehicle hours of travel
				average speed
				congested speeds
				delays: duration, extent, severity
				delay per incident
				average travel time per trip
				persons per hour on the facility or corridor
				level of service
				congested lane miles
				% of vehicle miles traveled by functional classification
				vehicle miles traveled per lane mile
				delay per lane mile
				delay per vehicle miles traveled
				delay per trip
				delay per vehicle
				delay rate
				travel rate
				# and % of signal cycle failures
				total vehicle delay
				average and maximum queues
				Person throughput per hour
			Roadside Rest Areas	Usage
		Intelligent Transportation		Reduction of system-wide delay
				# of inquiries or hits on travel information services such as kiosks

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				Reduced operational expenses for transit properties in monitoring ridership and fare
				# of emergency dispatches re-directed to avoid congestion or incident related delays
		Congestion Mitigation and Air		Increases in average speed
				Reduction in delay (duration, extent, severity) for various indicators (trips, vehicles, mile, etc.)
				Reduction in congested vehicle miles of travel (VMT)
				Reduction in congested vehicle hours of travel (VHT)
				Increases in congested speeds
				Increases in person throughput per hour
				Increases in vehicle occupancy
				Single occupant vehicle trips eliminated
				# of ozone action days
		Safe routes to school		Reduction in crashes involving school children
				Safety audits completed
				Participating schools
				# of projects or physical improvements completed to improve safety (sidewalks, signs)
				Weighted evaluation criteria (to be developed)
MN	Metropolitan Council	ECONOMIC		Cost Effectiveness
		MULTIMODAL		Delay Reductions Peak Period in Managed Lanes
				Opportunity for Implementation
				Person Throughput
				Travel Time Savings
		ROADWAY		Carpool Attractiveness
				Vehicle Miles Traveled Reductions

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				Vehicle Throughput
		TRANSIT		Transit Attractiveness
				Transit Suitability
MO	Capital Area MPO	Keep Customers and Ourselves Safe		# and rate of fatalities and serious injuries
				# of vulnerable roadway user fatalities and serious injuries
				# of fatalities and serious injuries resulting from the most frequent crash causes
				# of fatalities and serious injuries in work zones
				% of safety belt/passenger vehicle restraint use
				# of commercial motor vehicle crashes resulting in fatalities and serious injuries
				# of lost workdays
				Total and rate of MoDOT recordable incidents
				General liability claims and costs
		Keep Roads and Bridges in Good Condition		% of major highways in good condition
				% of minor highways in good condition
				Condition of state bridges
				% of structurally deficient deck area on National Highway System
		Provide Outstanding Customer Service		% of overall customer satisfaction
				% of customers who view MoDOT as Missouri's transportation expert
				% of customers who trust MoDOT to keep its commitments to the public
				% of customers who feel MoDOT provides timely, accurate and understandable information
				% of customers who believe completed projects are the right transportation solutions

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				% of customers satisfied with MoDOT's customer service
				% of customer communication engagement
				% of partner satisfaction
		Deliver Transportation Solutions of Great Value		% of programmed project cost as compared to final project cost
				% of projects completed on time
				% of change for finalized contracts
				Innovative contracting methods
				Value Engineering
				Average highway lane-mile and bridge construction costs
		Operate a Reliable and Convenient Transportation System		Travel times and reliability on major routes
				Cost and impact of traffic congestion
				Average time to clear traffic incident
				Traffic impact closures on major interstate routes
				Work zone impacts to the traveling public
				Effectiveness of improving air quality
				Time to meet winter storm event performance objectives
				Bike/pedestrian and ADA Transition Plan improvements
				Use and connectivity of modes of transportation
		Use Resources Wisely		# of full-time equivalencies expended
				Level of job satisfaction
				Rate of employee turnover
				State and federal revenue projections

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				# of dollars generated through cost-sharing and partnering agreements for transportation
				% of local program funds committed to projects
				Inactive projects
				Amount of advance construction
				Fleet utilization and fuel efficiency
				# of tons of recycled material
				# of environmental warnings and violations
		Advance Economic Development		Economic return from transportation investment
				National ranking of transportation infrastructure
				MoDOT national ranking in revenue per mile
				Goods movement competitiveness
				Freight tonnage by mode
				Annual hours of truck delay
				Truck reliability index
				Jobs created by projects funded through the economic development program
				% of minorities and females employed
				% of disadvantaged business enterprise participation on construction and engineering projects
				Expenditures made to certified minority, women and disadvantaged business enterprises
MO / KS	Mid-America Regional Council	Accessibility		Transit service: Total revenue service hours
				Transit service: Average transit boardings per revenue service hour
				Bicycle-pedestrian accessibility: # of obligated TIP projects with bicycle and pedestrian elements

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				Environmental justice: % of total federal funds invested in environmental justice tracts
		Economic Vitality		Freight movement: Tonnage of goods moved
				Activity centers: # of annual TIP projects within activity centers
				Transportation costs: Annual cost of congestion per commuter
		Climate change / energy use		Vehicle miles traveled (VMT): Vehicle miles traveled per capita (MARC counties)
				Vehicle occupancy: Average # of vehicle occupants
		Environment		MetroGreen® network: Completed Metro Green® network miles
				Carbon dioxide: Pounds of system-wide CO2 emitted during congestion only (millions)
				Carbon dioxide: Pounds (millions) per auto commuter (CO2 produced during congestion only)
		Place Making		Multimodal options: % of work trips using alternative modes (transit, bicycling, walking, etc.)
				Multimodal options: % of people driving alone to work
		Public health		Ozone pollution: Three-year average of ground-level ozone readings (parts per billion)
				Ozone pollution: # of annual ozone pollution violations
				Physical health: % of adults obese in Kansas City Region
				Physical health: % of adults physically inactive in Kansas City Region
		Safety and security		Crash fatalities: # of annual crash fatalities
				Crash fatalities: # of annual crash fatalities per 100,000,000 Vehicle miles traveled
				Disabling injuries: # of annual disabling injuries

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				Disabling injuries: # of annual disabling injuries per 100,000,000 vehicle miles traveled
		System conditions		Bridge conditions: % of structurally deficient bridges
				Bridge conditions: % of functionally obsolete bridges
				Pavement condition: % of Kansas roads in MARC region classified as “poor” condition
				Pavement condition: % of Missouri roads in MARC region classified as “not good” condition
		System performance		Travel speeds: Average travel speed (MPH) on highways
				Congestion: % of urban roadways congested
				Travel time: Annual hours of delay per auto commuter
MT	Missoula City-County Office of Planning and Grants			1. Rate of serious injuries per 100 million vehicle miles traveled (VMT)
				2. Rate of fatalities per 100 million
				3. # of serious injuries
				4. # of fatalities
				5. Pavement condition on the Interstate system
				6. Pavement condition on the non-Interstate NHS
				7. Bridge condition on the NHS
				8. Traffic congestion
				9. On-road mobile source emissions
				10. Freight movement on the Interstate
				11. Performance of the Interstate
				12. Performance of the non-Interstate NHS
ND	Fargo-Moorhead Metropolitan COG	Goal 1: Maintain the Existing Transportation System	Maintain and repair existing roads, bridges, sidewalks, and/or multi-use trails to good condition. This objective states that the	

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
			proposed project includes maintenance of an existing road, trail, sidewalk or bridge facilities to a minimum good or better condition.	
			Increase access to additional modes by replacing and retrofitting transportation facilities in the existing system to allow for a wide range of transportation options. This objective recognizes that opportunities for walking, bicycling or taking transit may not be available for some facilities. In order to increase the efficiency of the overall system, non-motorized and transit travel choices should be considered in any retrofit project.	
		Goal 2: Improve the Efficiency, Performance and Connectivity of a Balanced Transportation System	Minimize travel times and congestion by methods, such as providing increased capacity, direct routes between destinations, use of intelligent transportations systems, and transportation demand management.	
			Promote Complete Streets concepts so that streets are planned, designed, and operated to maximize safe access for all users including pedestrians, bicyclists, motorists, and transit riders of all ages and abilities.	
		Goal 3: Maximize the Cost Effectiveness of Transportation	Plan for a transportation system that is affordable, sustainable, and makes the best use of public financial resources.	
		Goal 4: Promote Consistency between	Provide a transportation network which supports existing and future high trip	

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
		Land Use and Transportation Plans to Enhance Mobility and Accessibility	destination areas including city centers, activity centers, and corridors.	
			Develop projects to catalyze centers including infill and redevelopment areas.	
		Goal 5: Provide Safe and Secure Transportation	Support transportation programs and design improvements which reduce crashes and improve safety of all modes.	
			Facilitate the rapid movement of first responders and support incident management during times of emergency.	
		Goal 6: Support Economic Vitality	Facilitate the movement of goods and freight to commercial and industrial centers. The ease with which industrial and commercial facilities can receive goods and ship products is important to their economic viability. Transportation facilities that allow direct, convenient access to these centers can decrease the conflicts with other traffic and increase the efficiency of the shipping process.	
			Support new and existing commercial and industrial development by ensuring access by multiple transportation modes. While it is important that freight haulers have access to commercial and industrial facilities, it is equally important that the customers and employees of these facilities have safe and adequate access. Transportation facilities should include multiple modes to allow access by all users, as well as being appropriately sized to allow access by each	

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
			mode without sacrificing the safety of another.	
		Goal 7: Protect the Environment and Conserve Resources	Reduce fossil fuel consumption by minimizing travel time and providing access to alternative modes. The use of fossil fuels affects our air quality through increased greenhouse gases, particulate matter, and potential impacts to global warming. The U.S. Environmental Protection Agency defines Clean Air Act thresholds.	
			Minimize air pollution by reducing VMT. Mobile source emissions are directly related to VMT. The land use and transportation plan should, therefore, reduce to the extent possible VMT and delay.	
			Minimize impact to natural environments by taking opportunities to couple transportation projects with protection and enhancement of environmental resources.	
			New or widened transportation facilities should minimize impacts to established neighborhoods. Transportation projects should avoid displacing citizens, disrupting or impacting valuable cultural resources, and dividing neighborhoods. This is particularly true in regards to environmental justice by avoiding impacts in areas of low incomes and minority concentrations. Conversely, these impacts to low income and minority areas can be positive with additional mobility	

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
			opportunities including walking, bicycling, and transit.	
NJ	South Jersey Transportation Planning Organization	(1) Promote transportation choices for movement of people and goods		· Is the region making progress in increasing bicycle lanes and paths?
				· Is transit ridership increasing?
		(2) Support the regional economy		· Are TIP projects benefiting employment and retail centers?
		(3) Improve transportation safety		· Are our roads safer for general and evacuation use?
				· Are we advancing safety initiatives?
				· Have vehicle fatalities declined?
		(4) Improve security		· Are the evacuation routes serving the SJTPO region in good condition?
		(5) Mitigate traffic congestion		· Are we driving less?
				· Are roadways congested?
		(6) Protect and enhance the environment		· Has air quality improved?
				· What is the region's carbon footprint?
		(7) Enhance the integration and connectivity of the transportation system		· Has accessibility to transit stations/bus stops improved?
				· How interconnected is the system?
		(8) Restore, preserve and maintain existing transportation system		· What is the health of transport infrastructure, including pavement and bridges?
NV	Transportation Commission (RTC) of Washoe County	Improve Safety		• Preventable transit accidents per 100,000 miles of service • # of crashes (vehicle, bike, pedestrian)/# of crashes per Vehicle Miles Travelled (VMT) • # of serious injuries per VMT • # of fatalities (vehicle, bike, pedestrian)/# of fatalities per VMT • Miles of bicycle lanes added & % of Bicycle Pedestrian Master Plan completed

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				• Miles of sidewalks added or enhanced & % of ADA Transition Plan completed
		Manage Existing Systems Efficiently		• Pavement Condition Index for Regional Roads • Preventive maintenance of transit rolling stock and facilities • Maintain industry standard vehicle life cycle
		• Manage Existing Systems Efficiently • Integrate All Types of Transportation		• Transit passengers per service hour • Traffic congestion delay • Vehicle Miles Travelled per person
		Manage Existing Systems Efficiently		• Transit on-time performance
		• Integrate Land Use & Economic Development • Improve Freight & Goods Movement • Focus on Regional Connectivity		• I-80 level of service • Greg Street level of service
		• Promote Healthy Communities & Sustainability • Integrate Land Use & Economic Development • Integrate All Types of Transportation		• Auto emissions • Transit fleet mix — alternative fueling technologies • Alternative mode share by corridor • Alternative mode share in the transit service area
NY	Ithaca-Tompkins County Transportation Council	Safety (and Security)	Progressively reduce the # of motor vehicle crash fatalities and injuries in Tompkins County.	# of average annual crash fatalities in the last five years
				# of average annual crash fatalities per VMT in the last five years
				# of average annual serious injuries in the last five years
				# of average annual serious injuries per VMT in the last five years

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
			Progressively reduce the # of annual bicycle and pedestrian crashes and the # of crashes with serious injuries in Tompkins County.	# of average annual bicycle / pedestrian crashes in the last five years
				# of average annual bicycle / pedestrian crashes with serious injuries in the last five years
			Progressively reduce the # of annual bicycle and/or pedestrian crash fatalities to zero by 2025.	# of bicycle / pedestrian fatalities
		Infrastructure Condition (System Condition)	Progressively reduce the # of structurally deficient bridges in Tompkins County.	% of structurally deficient bridges
			Progressively reduce the miles of state roads in 'poor' condition in Tompkins County.	# of miles of State roads in Tompkins County in 'poor' condition
		Congestion Reduction (System Performance)	Manage congestion to maintain adequate system performance on the National Highway System (NHS) roads (SR-13).	# of miles of congested NHS roads -- miles >80% volume-to-capacity (VOC)
		System Reliability (Accessibility/Place Making)	Progressively increase the provision and access to multiple transportation options.	TCAT: Total revenue service hours TCAT: Avg transit boardings per hour TCAT: annual # of bicycles on buses
				# of 'obligated' transportation improvement program (TIP) projects with bicycle and/or pedestrian elements
				Miles of multi-use trails
				Miles of on-road bicycle travel dedicated facilities
				% of population living within 1/2 mile of transit
				% of work trips using non-drive alone modes (transit, bicycling, walking, rideshare, etc.)
				Miles of "complete streets" (bus, bike and pedestrian facilities)
		Environmental Sustainability (Climate Change / Energy Use)	Progressively reduce the environmental impact associated with the transportation sector.	Vehicle Miles Traveled per capita
				Tons of system-wide carbon dioxide emitted
				% of population growth located in the ITCTC urbanized area and villages

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				# of personal vehicles per household / # of households
		Reduced Project Delivery Delays	Working with Federal, State and local partners, reduce the amount of time it takes for projects to advance to implementation.	Average # of years between first inclusion in the TIP and funds obligated for the final phase of the project – usually construction and construction inspection – for previous 5 year period
NY	New York Metropolitan Transportation Council	BICYCLE/PEDESTRIAN		Miles of Bicycle Facilities
		ECONOMIC		Freight Volume By Mode
		MULTIMODAL		# of Inter-County Travel Trips
				Total Trips Per Day
				Travel Time To Work in Minutes
		ROADWAY		Total Vehicle Trips Per Day
				Vehicle Hours Traveled Per Day
		SAFETY		Annual Crashes
				Annual Crashes Resulting in Fatality
				Annual Crashes Resulting in Injury
				Annual Crashes Resulting in Property Damage
				# of Bicycle Fatalities Per Year
				# of Pedestrian Fatalities Per Year
				# of Transit Accidents Per Year
				# of Transit Accidents Resulting in Fatality Per Year
				# of Transit Accidents Resulting in Injury Per Year
				# of Vehicles Involved in Crashes by Crash Type Per Year
		TRANSIT		# of Daily Transit Trips Region-Wide, by Mobility Corridor, and for Individual Regional Centers
OH	Mid-Ohio Regional	Economy	Congestion	% of the transportation system under congested conditions based on vehicle miles traveled (VMT) - Daily

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
	Planning Commission			% of the transportation system under congested conditions based on vehicle miles traveled (VMT) - Peak Period
			Transportation options	Miles of bikeways (at least 10 per year)
		Natural Resources	Air quality	Meet EPA air quality standards for each criteria pollutant - Ozone
				Meet EPA air quality standards for each criteria pollutant - PM2.5
		Energy	Energy consumption	% of commuters driving alone
		Collaboration	Multi-jurisdictional participation	% of communities conducting new transportation studies that include multi-jurisdictional participation
		People	Transit	% of population and jobs within census-defined urbanized area that are within ¾ mile of a transit stop
			Bike facilities	% of population and jobs within census-defined urbanized area that are within ¾ mile of bike facilities
			Safety	# of crashes per million vehicle miles traveled (VMT), on collector or above roadways, for all travelers
			Bridges	% of structurally deficient and/or functionally obsolete bridges
			Pavement conditions	% of lane miles of streets (collectors and above) with unacceptable pavement conditions, based on ODOT ratings
		Neighborhoods	Complete streets	% of communities adopting complete streets policies or policies that contain those elements
			Environmental justice	% of disadvantaged population average trip travel time compared to the regional average trip time
			Density	Density (people and jobs per acre) within ¾ mile of roadways (arterials and above)

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
OR	Metro	BICYCLE/PEDESTRIAN		# of Daily Bicycle Trips Region-Wide, by Mobility Corridor, and for Individual Regional Centers
				# of Daily Walking Trips Region-Wide, by Mobility Corridor, and for Individual Regional Centers
				% of Regional Bicycle System Completed Region-Wide and by Mobility Corridor
				% of Regional Pedestrian System Completed Region-Wide, by Activity Centers, and by Transit/Mixed-Use Corridors
				Share of Daily Bicycle Trips Region-Wide, by Mobility Corridor, and for Individual Regional Centers
				Share of Daily Walking Trips Region-Wide, by Mobility Corridor, and for Individual Regional Centers
		ECONOMIC		Average Household Cost of Combined Housing and Transportation
		ENVIRONMENTAL		Emissions CO
				Emissions Ozone
				Emissions PM 10
		LAND USE		Average Travel Time For Transit between Key Origin-Destinations during Mid-day
				Average Travel Time For Transit between Key Origin-Destinations during PM Peak
				# of Households Within 30-Minutes of Central City, Regional Centers, and Key Employment/Industrial Areas for PM Peak
				# of Households Within 30-Minutes of Central City, Regional Centers, and Key Employment/Industrial Areas for Mid-day

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				# of Jobs Within 30-Minutes of Central City, Regional Centers, and Key Employment/Industrial Areas for Mid-day
				# of Jobs Within 30-Minutes of Central City, Regional Centers, and Key Employment/Industrial Areas for PM Peak
				% of Households Within 30-Minutes of Central City, Regional Centers, and Key Employment/Industrial Areas for Mid-day
				% of Households Within 30-Minutes of Central City, Regional Centers, and Key Employment/Industrial Areas for PM Peak
				% of Jobs Within 30-Minutes of Central City, Regional Centers, and Key Employment/Industrial Areas for Mid-day
				% of Jobs Within 30-Minutes of Central City, Regional Centers, and Key Employment/Industrial Areas for PM Peak
		MULTIMODAL		Average Trip Length By Mobility Corridor
				Hours of Delay Total Daily Vehicle Hours
		ROADWAY		Average Incident Duration On Throughway System
				Average Travel Time For Motor Vehicles between Key Origin-Destinations during Mid-day
				Average Travel Time For Motor Vehicles between Key Origin-Destinations during PM Peak
				Congestion By Location of Arterials That Exceed Level of Service Thresholds in Mid-day
				Congestion By Location of Arterials That Exceed Level of Service Thresholds in PM Peak
				Congestion By Location of Freight Networks That Exceed Level of Service Thresholds in Mid-day

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				Congestion By Location of Freight Networks That Exceed Level of Service Thresholds in PM Peak
				Congestion By Location of Throughways That Exceed Level of Service Thresholds in Mid-day
				Congestion By Location of Throughways That Exceed Level of Service Thresholds in PM Peak
				Travel Time Reliability On Throughways
				Vehicle Hours Traveled
				Vehicle Hours Traveled Per Capita
				Vehicle Miles Traveled Per Day
		SAFETY		# of Crashes Per-Capita Travel Region-Wide All Modes
				# of Fatalities Per-Capita Travel Region-Wide All Modes
				# of Serious Injuries Per-Capita Travel Region-Wide All Modes
		TRANSIT		# of Daily Shared-Ride Trips Region-Wide, by Mobility Corridor, and for Individual Regional Centers
				# of Daily Transit Trips Region-Wide, by Mobility Corridor, and for Individual Regional Centers
				Share of Daily Shared-Ride Trips Region-Wide, by Mobility Corridor, and for Individual Regional Centers
				Share of Daily Transit Trips Region-Wide, by Mobility Corridor, and for Individual Regional Centers
				Transit Productivity Boarding Rides per Revenue Hour Bus
				Transit Productivity Boarding Rides per Revenue Hour for High-Capacity Transit
PA		Safety	Reduce total crashes	Total Crashes/VMT

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
	Harrisburg Area Transportation Study		Reduce fatality crashes	Fatalities/VMT
			Reduce injury crashes	Injury Crashes/VMT
			Reduce bike/pedestrian crashes	Bike/Ped Crashes
		Infrastructure Condition: Highway	Reduce high IRI levels	International Roughness Index (IRI)
		Infrastructure Condition: Bridge	Reduce SD or FO bridges	Structurally Deficient (SD) or Functionally Obsolete (FO)
		Infrastructure Condition: Transit	Decrease average age	Average bus fleet age
		Congestion	Increase LOS	Level of Service (LOS)
			Reduce SOV by: Increase in transit ridership Increase in Commuter Services Rideshare Program	Single Occupancy Vehicles (SOV)
		System Reliability	Reduce Delay/Increase Speed	Travel time delay
		Freight	Increase truck travel speed	Travel time delay
		Environment	Decrease Ozone/PM 2.5	Air Quality
PA	Delaware Valley Regional Planning Commission	BICYCLE/PEDESTRIAN		Annual Bicycle Trips
				Annual Pedestrian Trips
				Total Bicycle and Walking Trips
		MULTIMODAL		Hours of Delay
				Hours of Delay Per Capita
		ROADWAY		Annual Vehicle Trips
				Average Roadway Speed Peak-Period
				Vehicle Miles Traveled
			SAFETY	Annual Crashes
			TRANSIT	Annual Transit Trips
TN	CHCNGTPO	System Maintenance	Preserve, maintain and improve existing infrastructure	Pavement: % Lane Miles in Good/Fair Condition
				Bridge: Average Health Index

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
		Congestion Reduction	Reduce delay on critical regional thoroughfares	Average Commute Trip Time, Auto and Transit
		Safety and Security	Improve operations, maintenance, and ADA compliance	# of Projects (and Total Funding) Addressing RTP Safety Areas
		Economic Growth/ Freight Movement	Improve intermodal connections Reduce delay on critical freight corridors	Annual Congestion Costs, Truck and Auto
		Environmental Sustainability	Incentive complete streets projects Support desired community character Support healthy, safe communities Promote safe connections to community resources	VMT per Capita
		System Reliability	Expand set of travel options Encourage connected, multimodal network Improve system operations Incentivize corridor protection plans	Mode Split
		Project Delivery		
TX	Wichita Falls MPO	Mobility & Accessibility		Travel time
				Travel delay from traffic congestion
				Miles traveled by car
				Transit use
				Access to emp & educational opportunities (time separating consumers from major destinations)
		State of Good Repair		Infrastructure construction costs: roads, transit, sewer, water, etc.
		Economic Vitality		Freight movement time and congestion
				Economic revitalization and growth through infill/ redevelopment
				Cost of living: both Housing + transportation expenses
		Cost Efficiency		Transportation costs per user

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				Extent to which existing roads and transit are being optimally utilized
		Urban Form and Community		Community Impacts such as to parks, disadvantaged communities, properties, & places of worship
				Expansion of the urban area footprint
				Growth in centers and walkable communities
		Health, Safety and Security		Air quality
				Crashes
				Active transportation: walking and cycling
		Environmental Sustainability		Energy use by transportation and by buildings
				Natural resource land impacts
UT	Wasatch Front Regional Council	BICYCLE/PEDESTRIAN		Miles of Bicycle Facilities
		ECONOMIC		Project Costs
		ENVIRONMENTAL		Emissions CO
				Emissions CO2
				Emissions NOx
				Emissions PM 2.5
				Emissions VOC
				Environmental Impacts Natural and Urban Resources (49 Categories)
		LAND USE		Average Commute Time Transit Commutes of 20-Minutes or Less to Activity Centers during Peak Hours
		MULTIMODAL		Average Travel Time All Purposes
				Hours of Delay Annual Hours during Peak Periods
				Miles of Co-Incident Projects

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
		ROADWAY		Average Commute Time Auto Commutes of 20-Minutes or Less from Areas w/High Concentrations of Disadvantaged Populations during Peak
				Average Commute Time Auto Commutes of 20-Minutes or Less to Activity Centers during Peak Hours
				Average Travel Time From Freight Centers to Freeways
				Vehicle Miles Traveled Per Day
			SAFETY	Crash Rate On Roads in which Roadway and Public Transit Projects are Proposed
		TRANSIT		Average Commute Time Transit Commutes <=20-Minutes from Areas w/High Concentrations of Disadvantaged Populations during Peak Hours
				# of Daily Transit Trips
				Total Transit Passenger Miles Per Day
VA	Fredericksburg Area MPO	Congestion Reduction		Annual Hours of Delay per Peak Period Traveler
				Annual Gallons of Fuel Lost Due to Congestion per Peak Period Traveler
		Safety		# of Highway Fatalities and Fatality Rate per 100 million VMT
				# of Highway Crashes and Crash Rate per 100 million VMT
				# of Transit Crashes and Fatalities
				Annual Transit Crashes per 100 million PMT
				Annual Transit Injuries per 100 million PMT
				Annual Transit Fatalities per 100 million PMT
				# of Aviation Crashes and Fatalities
				Annual Aviation Crashes
				Annual Aviation Fatalities

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
		Transit Usage		# of Transit Trips Per Capita
				Annual Transit Revenue Miles per Capita
				# of Annual Transit Revenue Miles
				Annual Transit Passenger Miles Travelled per Capita
		HOV Usage		# of Persons per Hour per HOV Lane During Peak Period
				# of Park and Ride Lots and Spaces
				# of Occupied Park and Ride Spaces per 100,000 population
		Jobs-to-Housing Ratio		Ratio of jobs to households at the regional & county levels
				Regional Linear Jobs-Households Dissimilarity index (0.0 to1.0)
				Ratio of jobs to work force
				Inter and Intra regional commuting data
				Mean Travel Time to Work
		Job and Housing Access to Transit		% of households in TAZs served by transit
				% of employment in TAZs served by transit
		Job and Housing Access to Pedestrian Facilities		% of Housing Units Living in TAZ's/Census Block with 1%+ walk-to-work mode share
		Air Quality		Annual # of Days when Ozone Levels were Above 8-Hour Standard
				Greenhouse Gas Emissions produced by the transportation sector in Virginia #
				Grams of CO2 (greenhouse gas from motor vehicles) per capita per day, near future #
				Volatile Organic Compounds (VOC) and Nitrogen Oxides (NOx) emitted into the air from highway vehicles

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				Grams of VOC per capita per day and NOx per capita per day, near future
		Movement of Freight		% of Freight Transported by Rail or Barge
				Truck & Rail Mode Share, by value
				Truck & Rail Mode Share, by tons
		Daily Vehicle Miles Traveled per Capita		Vehicle Miles Traveled Per Capita
VA	Tri Cities Area MPO			#1 - Annual Hours of Delay Per Peak Period Traveler in the Richmond, Virginia Urbanized Area
				#2 - Annual Gallons of Fuel Lost Due to Congestion Per Peak Period Traveler in the Richmond, Virginia Urbanized Area
				#3 - # of Highway Crashes in the Crater Planning District (PDC 19)
				#4 - # of Highway Crashes Per 100 Million Vehicle Miles of Travel (VMT) in the Crater Planning District
				#5 - # of Highway Fatalities in the Crater Planning District
				#6 - # of Highway Fatalities Per 100 Million Vehicle Miles of Travel (VMT)
				#7 - # of Petersburg Area Transit (PAT) Crashes
				#8 - # of PAT Fatalities
				#9 - Annual Transit Crashes Per 100 Million Passenger Miles Traveled (PMT)
				#10 - Annual Transit Fatalities Per 100 Million PMT
				#11 - # of Bicycle Crashes and Pedestrian Injuries in Crashes
				#12 - # of Bicycle and Pedestrian Fatalities
				#13 - # of PAT Transit Trips Per Capita
				#14 - Annual Transit PMT Per Capita
				#15 - Annual Transit Revenue Miles Per Capita

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				#16 - # of Annual Transit Revenue Miles
				#17 - Annual Passenger Rail Ridership
				#18 - # of Registered Vanpools
				#19 - Ratio of Jobs by Place of Work to Households at the Transportation Study Area and Jurisdictional Levels
				#20 - Regional Linear Jobs-Households Dissimilarity Index (0.0 to 1.0)
				#25 - Annual # of Days When Ozone Levels Were Above 8-Hour Standard
				#28 - Daily Vehicle Miles of Travel (VMT) Per Capita on Arterial and Primary Roadways in the Richmond, Virginia Urbanized Area
WA	Puget Sound Regional Council	Air Quality (Environment)		Summarize annual monitoring reports from PSCAA and Ecology (CO, PM10, PM2.5, NOX, O3)
				Summarize PSCAA emissions inventory by sector, show % of transportation sector emissions
				MAP-21 Placeholder
		Greenhouse Gas Emissions (Environment)		Narrative that qualitatively describes status of 4-part strategy assumptions
				Summarize Washington Department of Ecology emissions inventory, show % of transportation sector emissions, discuss trends in absolute emissions as well as emissions per capita
				Summarize energy consumption by source, highlighting clean and renewable sources, as reported by WA Department of Commerce
				Summarize energy usage by sector, total and per capita, as reported by WA department of Commerce
		Water Quality & ecosystems (Environment)		Project/investment tracking (by retrofits, natural water system restored, investments in new

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				treatments, fish & wildlife passage maintained or restored.)
				Water quality is improved (see VISION Monitoring), water quality indices
		Human Health		Summarize annual monitoring reports from PSCAA and Ecology (CO, PM10, PM2.5, NOX, O3)
				Project tracking (Noise type 1 &2 retrofit projects)
				% of Regional Bike Network complete
				The % of population with access to bicycle farcicalities
				Pedestrian walkway density in regional growth centers
		Equity		Projects connecting low opportunity areas with high opportunity areas
		Safety & Security		Annual serious injuries by mode & mode share (Target Zero) - bike & ped separate
				Annual fatalities by mode & mode share (Target Zero) - bike & ped separate
				Fatalities per 100 million VMT (mode & mode share) (5 year rolling average)
				Serious Injuries per 100 million VMT (mode & mode share) (year rolling average)
				Bicycle/Pedestrian Fatalities by *population** (separate bike/ped, mode & share) (5 year rolling average)
				Bicycle/Pedestrian Serious Injuries by *population** (separate bike/ped, modes & share) (5 year rolling average)
				Safety Project Tracking (Target zero, TIP, by mode, grade crossings)
				Personal Safety (Public opinion polls*, NTD reported transit crime data)

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				Security Project Tracking (level of investment) (resiliency/redundancy) (% Bridges meeting seismic standards)
		Accessibility		Using Maps show % of population with ____ mile network distance of: Core service, community connector, specialized service transit stops, Light rail stations, commuter rail stations (1/4-mile fixed-route bus transit, 1/2-mile rail transit, 3-miles from transit access points for bike, Park & ride distance TBD)
				Amount of employment (measured in jobs?) within 1/4 mile of transit service (or access points to transit, such as a bus stop, rail station, etc.)
				% of Regional Bike Network complete
				The % of population with access to bicycle farcicalities
				Pedestrian walkway density in regional growth centers
				# of secure bike parking in and adjacent to stations and centers
				Measure the transportation "level of service" available to special needs populations geographically. In lieu of having level of service standards in the short term use fixed route & ADA paratransit service combined. Longer term define level of service with the Special Needs Transportation Committee and in association with MAP-21 provisions for Section 5310.
				Potentially use the following: # of seniors and individuals with disabilities afforded mobility by WSDOT or (Metro...transit agency) they would not have without Section 5310 program support

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				Projects connecting low opportunity areas with high opportunity areas: % of people live & work in same center.
		Multimodal Mobility		Boarding's (ridership, per revenue hour, per platform hour, vanpool passenger trips) , boardings per mile
				On time performance
				% change in transit service levels (Include benchmarks) by core, community connector and specialized service
				Network of transit priority treatments is completed: HOV, HOT, BRT, and BAT lanes, Queue jumps, TSP etch (mapping)
				# of bus trips that serve ferries (# bus routes with stops 1/4 & 1/2 mile from ferry)
				# of secure bike parking in and adjacent to stations
				Park & Ride Utilization/Capacity
				Ferry ridership (off peak vs. peak trend), vanpool, walk on, drive on, off peak vs. peak
				Measure ferry boat capacity versus ferry boat utilization.
				% of Regional Bike Network complete
				Mode Share (break down by mode)
				WSDOT incident response # of incidents by duration for example less than of greater than 90)
				ITS efficiency project tracking (Mile of ITS, Adaptive systems, % freeway with ramp meters)
				TDM project tracking (car share implemented etc.)
				Roadway - travel time reliability index (WSDOT)

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				80th, 85th or 95th %tile. Match VISION 2040 (freeway, NHS, freight)
				Maximum throughput travel time index (max speed/speed)
				VMT is reduced (VMT, VMT per capita, average trip length)
				Vehicle Annual Hours of Delay (freeway, freight)
				Project tracking (chokepoints and bottlenecks) freeway & arterials
				Projects included in the Washington State Freight Mobility Plan are completed
				Project Tracking (grade crossings)
				Freight access improved to MICs
		Finance		Transportation Expenditure % of median personal income
				Financial strategy divided into 5-year (or less) increments - actual revenues and expenditures compared to estimates - by revenue category (toll rev, local, state, federal, total rev) by city county, transit, WSF and state programs
				Integrate/Modify regional TIP project tracking to support this outcome
				Qualitative description of the types of new revenue sources that are being implemented in the region. Should coincide with the Action Strategy development.
				Qualitative description of the types of new revenue sources that are being implemented in the region. Should coincide with the Action Strategy development.
		Maintenance & Preservation		Pavement Conditions by facility type (NHS, SR, interstate, arterials, bicycle network, transit

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
				corridors, WA State Truck Freight Economic Corridors)
				Pavement Conditions % of network in good, fair, poor condition (NHS, SR, interstate, arterials, bicycle network, transit corridors, WA State Truck Freight Economic Corridors)
				Locations of heavy loads on roadways (freight & transit) - predictive - where are we going to need to invest?
				Bridge Conditions - SD & FO rating (NHS, SR, interstate, local, transit corridors, WA State Truck Freight Economic Corridors)
				% Bridges with weight restrictions on functionally classified routes
				% Bridges meeting seismic standards
				Avg. age (surface life) of fleets (bus, ferry, rail)
				Ferry and HCT Terminal Conditions
		Economy		Projects included in the Washington State Freight Mobility Plan are completed
				Project Tracking (grade crossings)
				Freight access improved to MICs
				Amount of employment (measured in jobs?) within 1/4 mile of transit service (or access points to transit, such as a bus stop, rail station, etc.)
				Projects connecting low opportunity areas with high opportunity areas
WI	Chippewa-Eau Claire MPO	Safety: Streets and Highways		Indicators: Total Crashes, Total Fatal Crashes, Total Severe Injury Crashes
		Accessibility and Mobility of People and Freight: Streets and Highways		Indicator: Level of Service
				Indicator: System mileage

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
		Accessibility and Mobility of People and Freight: Transit		Indicator: Revenue Hours of Service, Revenue Miles of Service (from unlinked passenger trips, passenger miles, revenue hours, and revenue miles by system)
				Indicator: % urbanized area served by transit, % urbanized area served by shared ride taxi.
		Integration and Connectivity of the Transportation System, Across and Between Modes for People and Freight: Streets and Highways		Indicator: Designated park-ride capacity and use
		Integration and Connectivity of the Transportation System, Across and Between Modes for People and Freight: Air		Indicator: Airport Passenger Volume (enplanements)
		Efficient Management and Operations: Streets and Highways		Indicator: Traffic volume
				Indicator: Hours of congested travel
		Efficient Management and Operations: Transit		Indicator: Passengers/revenue hour of operation, passengers/revenue mile of operation, passenger miles traveled, # of passenger trips
		System Preservation: Streets and Highways		Indicator: Pavement condition – # of miles and % of total miles in each category
				Indicator: Structure Condition – Sufficiency Rating
		Regional Trends		Indicator: Population
				Indicator: Households
				Indicator: Employment
				Indicator: Economic Development - Housing permits and housing raisings by county and municipality
WI	Green Bay MPO	Transportation Structures and Pavement Condition Goal: Ensure that all	• Ensure that all transportation structures within the Metropolitan Planning Area have appropriate bicycle and pedestrian facilities when they are constructed or	

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
		transportation structures (bridges, interchanges, and overpasses) within the Green Bay Metropolitan Planning Area are safe for and accessible to all transportation modes.	reconstructed. • Ensure that all transportation structures in the Metropolitan Planning Area have adequate sufficiency ratings by 2020.	
		Transportation Structures and Pavement Condition Goal: Ensure that the condition of the Metropolitan Planning Area's functionally classified highway and street system is adequate.	• Elevate the condition of all functionally classified county highways and local streets within the Metropolitan Planning Area to a minimum of 5 (Fair) on the state's Pavement Surface Evaluation and Rating (PASER) scale by 2020. • Elevate the condition of state and federal highways to a minimum rating of Fair on the state's pavement rating scale by 2020.	
		Transportation Safety Goal: Improve safety on the Green Bay Metropolitan Planning Area's multimodal transportation system.	• Reduce the average annual # of fatal motorized vehicle crashes by 50 % before 2020. • Reduce the average annual # of motorized vehicle crashes that involve incapacitating injuries by 20 % before 2020. • Reduce the average annual # of fatal bicycle crashes to zero before 2020. • Reduce the average annual # of bicycle crashes that involve incapacitating injuries by 20 % before 2020. • Reduce the average annual # of fatal pedestrian crashes to zero before 2020. • Reduce the average annual # of pedestrian crashes that involve incapacitating injuries by 20 % before 2020.	

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
		Highway and Street Operation, Safety, and Accessibility Improve traffic operations and reduce traffic congestion on the Green Bay Metropolitan Planning Area's functionally classified highway and street system.	• Achieve a Level of Service (LOS) rating of D or better for every functionally classified street and highway segment in the Metropolitan Planning Area by 2020. • Reduce total delay per vehicle per mile by (amount TBD) on the Metropolitan Planning Area's functionally classified street and highway system by 2020. • Reduce total delay per mile by (amount TBD) on the Metropolitan Planning Area's functionally classified street and highway system by 2020.	
		Highway and Street Operation, Safety, and Accessibility Goal: Design arterial, collector, and local streets to maximize efficient traffic circulation while enabling people of all ages and physical abilities to conveniently and safely cross and travel along them.	• Encourage and offer planning assistance to the state, county, and Metropolitan Planning Area communities to continue to construct or reconstruct arterial streets as two-lane boulevards or three-lane streets instead of four-lane streets unless transportation studies demonstrate that more lanes are necessary. • Encourage and offer planning assistance to the state, county, and Metropolitan Planning Area communities to continue to construct curb extensions (bump-outs) at collector and local street intersections and other pedestrian crossing points when parking lanes are present. • Encourage and offer planning assistance to the state, county, and Metropolitan Planning Area communities to continue to place roundabouts at arterial and collector street intersections when the intersections are constructed or reconstructed unless	

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
			adequate space is not available because of physical or environmental barriers.	
		Bicycle and Pedestrian Facilities Goal: Develop a bicycling and walking culture in the Green Bay Metropolitan Planning Area that enables people of all ages and physical abilities to safely and conveniently travel throughout the area.	• Ensure that construction and reconstruction projects satisfy the requirements of Wisconsin's "complete streets" statute (Ch. 84.01(35)) and corresponding administrative code (Trans 75) to qualify for Surface Transportation Program – Urban (STP-U) funds through the MPO. • Increase the # of rating points that are awarded to projects that include appropriate bicycle and pedestrian facilities in the MPO's Transportation Improvement Program (TIP) project prioritization process. • Ensure that the bicycle and pedestrian facility components of construction and reconstruction projects are consistent with the guidance for bicycle and pedestrian facilities in Chapter 11-46 of the Wisconsin Department of Transportation's Facilities Development Manual (FDM) when prioritizing projects in the TIP. • Encourage and offer assistance to every community in the Green Bay Metropolitan Planning Area to develop a comprehensive bicycle and pedestrian plan and a sidewalk installation policy by 2020. • Provide assistance to the state, Brown County, and the Metropolitan Planning Area communities to increase the # of pedestrian countdown signals in the Green Bay Metropolitan Planning Area by 50 % by	

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
			2020. • Complete an inventory of bicycle parking accommodations at parks, government buildings, schools, shopping centers, major employers, and other bicycling trip generators in the Metropolitan Planning Area to determine if the accommodations should be improved and/or increased. This inventory should be completed by the end of 2016.	
		Public Transportation Goal: Increase the annual # of revenue passengers on Green Bay Metro's buses to at least 1.7 million by 2020.	Expand Metro's U-Pass program to include Northeast Wisconsin Technical College (NWTC) by 2020. • Recruit 10 businesses to participate in employee bus pass programs by 2020. • Continue to provide the Packers Game Day Service throughout the Metro service area. • Identify heavily-used bus stops and work with communities to increase the # of heavily-used stops that have concrete pads and sidewalk access by 20 % by 2020. • Increase ridership capacity by retiring Metro's 30' buses and replacing them with a combination of 35' and 40' buses by 2020. • Identify additional revenue sources to increase service frequency and coverage.	
		Transportation Services for Seniors and People with Disabilities	• Develop, update, and implement the recommendations in the Brown County Coordinated Public Transit-Human Services Transportation Plan.	

STATE	MPO	MPO Goals	MPO Objectives	MPO Performance Measures
		Goal: Meet the growing transportation needs of seniors and people with disabilities within the Green Bay Metropolitan Planning Area.	• Determine if a Brown County Mobility Manager should be appointed to connect providers of specialized transportation services with seniors and people with disabilities. • Administer the area's Section 5310 Enhanced Mobility of Seniors and Individuals with Disabilities Program. • Continue to work with the Brown County Transportation Coordinating Committee (TCC) to identify unmet transportation needs of seniors and people with disabilities.	
		Freight Transportation Goal: Reduce fuel consumption and maximize the lifespan and existing capacity of the Green Bay Metropolitan Planning Area's highway and street system by increasing the proportion of freight shipped to and from the area by rail, water, and air.	• Reestablish a minimum of one intermodal rail terminal in the Green Bay Metropolitan Planning Area by 2020. • Establish a Federal Inspection Station (FIS) at Austin Straubel International Airport by 2020. • Increase annual exports through the Port of Green Bay by 20 % by 2020. • Secure the federal authorization and funding necessary to increase the port's dredging depth to 26 feet and width to at least 250 feet by 2020.	